LAST MINUTE
OIL NEWS SECTION

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TRADE JOURNALS FREED IN MADISON TRIAL

Oil Tax Burden Theme of A.P.I. Annual Meeting

By E. L. BARRINGER
N. P. N. News Bureau

CHICAGO, Nov. 15. — Taxation in general, and particularly the undistributed profits tax, was the keynote of the 18th annual meeting of the American Petroleum Institute here last week.

Aside from technical developments in refining and production group meetings, the theme threaded through five days of meetings was how good a job the industry has done in providing the public with constantly improved products at progressively lower prices and how the industry continues to bear the brunt of the nation's tax bill.

In the election of officials for next year all officers were returned, with President Axtell J. Byles beginning a fourth term. Six new board members were elected. Five fill existing places and a sixth new member brings the total of American Petfoleum Institute directors to 108.

Two Resolutions

Only two resolutions were adopted by the board at this general institute meeting. One calls for a census of the industry's refining capacity. The other endorsed the National Fire Protective Assn.'s "Suggested Ordinance Regulating the Construction and Operation of Automobile Tank Trucks and Tank Trailers," and adopted it as the institute's standard.

Registration was 2300, President Byles announced. While there was the usual quota of technical men from refining and production, there was a dearth of attendance of top flight executives, some of whom were in Madison at the oil trial. There were no marketing group sessions to attract particular attention of this branch of the industry.

Following the president's address at the first general session Nov. 10, which brought to the

(*Continued on page 24*)

Dismissal Order

N. P. N. News Bureau

MADISON, Nov. 15.—Following is full text of the order, signed by Federal District Judge Patrick T. Stone, dismissing the indictment against the Platt defendants in the alleged conspiracy case:

IN THE DISTRICT COURT OF THE UNITED STATES FOR THE WESTERN DISTRICT OF WISCONSIN

United States of America vs. Standard Oil Co. (Indiana) et al., defendants	No. 11365 Order of Dismissal

"This cause having come on for trial the 4th day of October, 1937, a jury having been duly selected, impanelled and sworn and evidence having been introduced herein by the United States through witnesses subpoenaed by it and duly sworn by this Court and the United States through its attorneys having stated in open court this 11th day of November, 1937, just before the conclusion of its case that from the evidence adduced no cause of violation of law as charged in the indictment herein has been proven against the defendants Warren C. Platt, W. C. Platt Company (also referred to in the indictment as Platt's Oilgram) and The National Petroleum Publishing Company (also referred to in the indictment as National Petroleum News) and the United States through its attorneys having this day moved the Court for an order dismissing said cause as to the said Warren C. Platt, W. C. Platt Company and The National Petroleum Publishing Company and each of them and said defendants by their attorneys having objected to the granting of said motion and having moved the Court either to issue an order directing the United States to proceed with the prosecution of these defendants under the indictment herein to the conclusion of its case or in the alternative to instruct the jury to return verdicts of not guilty in favor of each of the defendants Warren C. Platt, W. C. Platt Company and The National Petroleum Publishing Company, the Court upon consideration thereof hereby overrules the said motion of said defendants and hereby grants the said motion of the United States and hereby dismisses the indictment herein as to each of said defendants and herewith discharges the said defendants and each of them, who may go hence without day.

"The defendants and each of them in view of their objections may have their exceptions hereto.

(Signed)—Patrick T. Stone,

Judge of the District Court of the United States for the Western District of Wisconsin.

Unable To Show a Connection With Alleged Conspiracy, Government Admits

By G. T. KELLOGG
N. P. N. Staff Writer
By Teletype

MADISON, Nov. 16. — Government counsel late today began their fight to block dismissal of the oil "conspiracy" indictment against any more defendants, following their voluntary dismissal last week of charges against seven corporations, including the three trade journals, and one individual, Warren C. Platt, Cleveland.

Following the government's move to dismiss the indictment against these defendants, defense counsel launched their arguments for a directed verdict in favor of the defendants remaining in the case. Their arguments were completed today and late this afternoon Government Counsel J. H. Lewin began his reply.

The government closed its case Friday, Nov. 12, after Judge Patrick T. Stone late the preceding day granted all the government's motions to dismiss, reducing the number of defendants on trial to 64 — 19 corporations and 45 individuals.

Defendants dismissed on the government's motion included: Tide Water Associated Oil Co.; Deep Rock Oil Corp.; Louisiana Oil & Refining Co.; Cities Service Export Oil Co.; NATIONAL PETROLEUM NEWS; *Platt's Oilgram;* The Chicago Journal of Commerce and Platt.

Before the government closed, however, Col. Wm. J. Donovan, chief of defense counsel, made another unsuccessful attempt to get the code into the record as a part of the prosecution's case. In declining to receive them, the court told Donovan he would take "judicial notice" of the code during arguments on motions to dismiss.

Donovan started argument on the general motions early Mon-

Indiana Standard's Purchases Listed

day, Nov. 15, and was followed by Goldthwaite Dorr, Socony-Vacuum counsel; T. P. Young, Shell attorney, and Frederick Wood, representing Sinclair.

The general motions to strike pointed out, first of all, that the indictment fails to allege the conspiracy in the jurisdiction of the court, that it does not describe and particularize the alleged conspiracy, that it shows on its face that the conspiracy did not restrain interstate commerce within the meaning of the Sherman act, that there is not substantial evidence to convict, and other grounds.

Defense counsel also contended that failure to involve the trade publications in the alleged conspiracy constituted a "fatal variance" from the allegations of the indictment.

Replying, Government Counsel Lewin sought to show that the government, contrary to the defense contentions, had proved the allegations of the indictment.

Judge Stone has taken under advisement all motions to strike, pending conclusion of the arguments. The jury is absent from courtroom.

Because of the crowded condition of the courtroom during the arguments, the jurymen's places are being occupied temporarily, by some of the defendants and their counsel.

Indiana Standard Witness

Government counsel were not ready with the accountant testimony they had planned to introduce when the session opened Wednesday, November 10, and instead called Charles J. Barkdull, Evanston, Ill., executive vice president of Standard Oil Co. (Ind.).

Barkdull, first official of the Indiana Standard to be called to the stand in the case, was questioned by government counsel concerning various officials of the company and their duties.

He said Allan Jackson, director and vice-president in charge of sales, was in charge of the department which determined the company's price policy; the duties of E. J. Bullock, vice-president in charge of purchases, included purchases of gasoline, and that E. G. Seubert, president "supervises the operations of the company very closely," to use words of Government Counsel Chaffetz.

Chaffetz then asked the question: "If Standard Oil Co. (Indiana) was engaged in a purchasing program, you'd assume Mr. Seubert would be familiar with it then?"

Before the witness could answer, Weymouth Kirkland, attorney for the company, objected to the question as hypothetical, and was sustained by the court.

Chaffetz tried in various ways to link Seubert's name with the alleged buying program, finally asking Barkdull if Bullock would participate in a buying program without consulting the president. Again Kirkland objected, but was overruled, and the witness answered "probably not."

On cross examination of Barkdull, Kirkland brought out that Seubert was not in Chicago all during February 1935. He asked the witness if he had ever heard Seubert say anything to indicate that the company was acting in concert with any other companies in a buying program, and was told that Barkdull had never heard Seubert discuss any program.

"You don't think Mr. Bullock would commit a crime with or without Mr. Seubert's permission, do you?" Kirkland asked, but Chaffetz immediately objected, and was sustained.

Then, turning to Kirkland the government attorney said,

"You admit that the running of a buying program is a crime?"

"What is the indictment for? Aren't we indicted for committing a crime?" returned Kirkland.

The Indiana Standard attorney then questioned Barkdull about the number of tank cars of gasoline purchased by his company from Mid-Continent independent refiners in the years from 1931 to 1936, and was told that the 1230 cars purchased in 1934 were the most bought in any one year during that period. Purchases in 1935 were 795 cars, and in 1936, 925 cars, Barkdull related. All were bought on specifications, he testified, and the highest monthly purchase during the period was 125 cars.

Later the witness testified that refinery inventories had been below what they should have been, and that it was the custom of the company, and of others he knew anything about, to build up inventories in winter to take care of peak demand in summer.

Asks About Purchases

This led Chaffetz, on re-direct examination, to ask if monthly purchases of 60, 75 or 125 cars were not "too insignificant" to have any effect on inventories or other factors mentioned. He brought out that monthly purchases of less than a half-million gallons had been made when inventories were 42 million gallons short of the 5,500,000 barrels Barkdull had testified refinery inventories should be kept at. The witness agreed the purchases were small in comparison with amounts by which he said actual inventories were below the 5,500,000 barrel mark during 1935 and 1936.

Turning to authority of company officials to purchase gasoline, Chaffetz asked if the authority to purchase "900, 1000 or 1200 tank cars of gasoline a year" was a matter in the hands of the purchasing department, without going to higher authority. Barkdull said it was.

"Market Leader"

The witness was questioned by Judge Stone as to Indiana Standard's position as a "market leader," and wanted to know if there had ever been any instance where it had "followed" a market decrease, or had to lower its own price because other companies did not follow its lead on an increase.

Barkdull said he didn't have the information, but that a perusal of records probably would reveal numerous such instances. He agreed with the judge, however, that this is not usual.

Kirkland brought out that Standard of Indiana is the "pioneer" company in the midwest area, and suggested the possibility this was the reason for its market leadership. The witness, in response to questions, denied that the company confers with any other companies in arriving at prices at which gasoline is to be sold.

Just before the witness was excused and court recessed for the day, because government counsel said all they had remaining to present was testimony of the accountant-witness, who was not yet prepared to take the stand, Col. Donovan asked Barkdull if the tank car price of gasoline was not subnormally low in 1934 and the early part of 1935. Barkdull said it was.

This was after Chaffetz had shown the witness a chart purporting to show how the tank car price had risen after the first few months of 1935.

Accountant Testifies

The government's accountant was ready to testify Thursday morning, Nov. 11, when court convened at 9 a.m. instead of the usual 10 a.m. to permit an early recess for Armistice Day exercises. The witness, W. J. Miller of the Federal Bureau of Investigation, was questioned by government counsel during most of the morning session, which closed at a little before 11 o'clock, and underwent cross-examination by defense attorneys during the afternoon.

Miller, who appeared as a government witness earlier in the trial, was first questioned about a tabulation he had made from figures produced by John M. Bradshaw, Dallas broker, when Bradshaw was on the witness stand Nov. 1 and 2.

Miller's tabulation covered purchases testified to have been made by Bradshaw for the Gulf companies during the period

Sunday Closing For East Texas Is Braking Move

By Teletype
N. P. N. News Bureau

TULSA, Nov. 16. — Reduction of 68,886 barrels daily from the allowable prevailing on Nov. 12, was ordered last night by the Texas Railroad Commission, following the monthly statewide hearing.

This was forecast last week in a statement made by Chairman C. V. Terrell, who said current demand was approximately 175,000 barrels daily less than production and that Texas, producing about 40 per cent of the nation's total, would reduce allowables by about 70,000 barrels.

The allowable Nov. 1 was 1,351,677 barrels but, through special orders and completion of producing wells, it had increased 71,352 barrels by Nov. 12. The special increases had amounted to more than 36,000 barrels.

The new figure, effective Nov. 16, was 1,354,143 barrels, which is 59,167 barrels less than the daily average recommended by the Bureau of Mines for November and 45,657 barrels less than the Bureau forecast of demand for December.

The East Texas field, long a problem, was left unchanged as to percentage of allowable but the Railroad Commission ordered the field shut in completely on four successive Sundays beginning Nov. 21. This is calculated to reduce total production over a month by about two million barrels. The Sunday shut down was referred to as an experimental venture in ascertaining well performances. The decline of bottom hole pressure in the field which had gone on for several months was interrupted in the latest pressure period. Commission engineers reported an increase of 12.37 pounds per square inch in a month.

Government Accountant Called to Stand

from March 1, 1935, through April 1936. He said it showed that 70 per cent of the 3535 cars purchased by Bradshaw for Gulf during the period were at *Platt's Oilgram* "low" for such gasoline. The figures were compiled, Miller said, from original purchase orders and invoices subpoenaed from the files of the companies.

The accountant testified that 2214 of the 3535 cars had been purchased through the East Texas Refiners' Marketing Assn., and that 1983 of these were purchased at the low quotation of *Platt's Oilgram* East Texas market. The remainder were below that quotation on date of sale, he said.

Other tabulations presented by Miller purported to show the number of tank cars of gasoline purchased by each of the defendant companies (except Sinclair) in each field (Mid-Continent and East Texas), by months, during the 14-month period, and a comparison of prices paid for such tank cars as were purchased at specific prices with *Platt's Oilgram* and Chicago Journal of Commerce prices on date of sale.

Donovan Objects

Col. Donovan objected to presentation of the tabulations without the Sinclair purchases, since these purchases, he said, would represent "approximately half of what this witness is talking about."

Government counsel said they would make a tabulation of the Sinclair figures and present them later, but Frederick Wood, Sinclair attorney said he would object to their inclusion if the tabulation were not presented before the close of the government's case.

To Argue from Documents

Chaffetz then said they would introduce the large volume of purchase orders and invoices subpoenaed from the Sinclair files, since it would take two weeks or more, according to Miller, to make up a computation. Chaffetz said the government would "argue from" the documents, rather than have the compilation made up.

Miller's tabulation showed that 8797 tank cars of gasoline, all third grade he said, were purchased by the defendant companies, except Sinclair, in the East Texas field during the 1935-'36 period. Under questioning by Lewin he said that 1305 of the cars purchased were based on the low of *Platt's Oilgram* and 7492 sold at a specific price. Of the latter, he testified that 73 per cent were purchased "at or above" the low of *Oilgram*. Questioned further, he revealed that 72.5 per cent were purchased at the low and only 0.5 per cent above the low. The remainder moved at prices below the low, he said.

With reference to Chicago Journal of Commerce quotations for the same grade of gasoline f.o.b. group 3, (which, he said, are normally 0.125 cent higher than the East Texas market), Miller said that of the gasoline which was purchased at specific prices, 79.4 per cent was purchased at 0.125 cent below the Journal's low, or higher. (Because of the differential, this quantity, he said, moved at the "low" or above.)

11,384 Cars Purchased

Similar figures for the Mid-Continent, in which the accountant said the companies bought 11,384 cars, both third grade and regular, during the period, were presented. Of the total, 9204 cars were purchased at a flat price, and 69.6 per cent of these were at the low of *Oilgram* for the Oklahoma market, the witness testified, adding that 71.3 per cent of the 9204 cars were purchased at the Journal of Commerce low for that market, 18.1 per cent below that low, and the rest above.

Miller testified that he had prepared his tabulations from invoices, purchase orders, shipping instructions, and other documents submitted by the defendant companies under subpoena.

On cross examination, Ralph Horween, counsel for Globe Oil & Refining Co., asked whether some of the Mid-Continent purchases were not of cars bought on the basis of f.o.b. Kansas or Oklahoma refinery points, and the witness said there may have been some. He had used the *Platt's Oilgram* Oklahoma market for all comparisons in the Mid-Continent purchases, he said.

Comparison Basis Questioned

Asked by Col. Donovan how he had arrived at his comparisons of prices, Miller said he had used the date of the purchase order to compare with the publications' prices on that day, where it was available, but that when it was not he used the invoice date.

Donovan continued his cross examination during the afternoon session Nov. 11, asking Miller if he considered gravity, gum content, vapor pressure, and other specifications in classifying gasoline represented by the purchase orders and invoices as third grade or regular. The witness said he had not, and told the defense attorney that "sometimes there was a whole paragraph of specifications" on the orders or invoices, "so I just decided whether it was motor or regular gasoline."

Col. Donovan then asked if it wasn't a fact that in most cases where cars were purchased above the "low" quotation, the specifications, other than octane rating, were more rigid.

Col. Donovan brought out that some of the purchases represented by the cars included in Miller's compilation were shipped over periods as long as a month, and in one instance, four months, and asked the witness:

"Isn't it a fact that purchases for shipment over a period of more than 15 days do not fall within the meaning of spot purchases?"

"Not Spot Transactions"

Chaffetz objected, but Donovan argued that purchases for shipment over periods of longer than 15 days were being compared with *Oilgram's* quotations for "spot" purchases.

"This computation is not proper if they are including as spot transactions, transactions which are not in fact spot purchases," Donovan declared, moving that the computation be not admitted. There was lengthy argument between opposing counsel, during which Chaffetz charged "the defendants expect to get out of this case because there is some technical definition of spot transaction." Chaffetz also contended that it made no difference over what period the purchases were shipped over.

Donovan then asked the witness if he knew that the bill of particulars said the purchases involved in the alleged conspiracy were "spot" purchases, and that his figures in the compilation covered other purchases as well. Chaffetz objected to this question, and was sustained.

The defense attorney then asked that the witness prepare him a list of the cars his tabulation showed were purchased at prices above the low of *Platt's Oilgram*, giving the buyer, seller, date of purchase and date of shipment. Government counsel objected, but consented to let Miller assist Donovan's staff in the compilation.

H. C. Walker, Louisiana Oil & Refining Co. attorney, then objected to admission of the compilations, so far as his company was concerned, since they included purchases made by it in the Mid-Continent area, "and we're not charged with supporting the Mid-Continent program."

Attorneys for several other companies made similar objections to the tabulation, asserting that it included purchases by their companies in areas in which they were not charged

IN THE NEXT ISSUE OF N. P. N.

What's New in Truck Equipment

EDITED BY JOHN W. THOMPSON

• Trends in truck design—the use of six-wheelers and semi-trailers—points to keep in mind in the selection of truck equipment—these and more are discussed in a symposium which includes a review of the recent 1937 Truck Show, at Newark, N. J., and the meeting of the Society of Automotive Engineers on transportation and maintenance held at the same time.

Included in the symposium are an article by N.P.N. Staff Writer John W. Thompson and portions from several addresses by experts on truck operation presented at the S.A.E. meeting. Topics will be discussed of vital interest to all oil company men who have a hand in operating truck transportation units efficiently and economically.

Glamour Sells Merchandise

BY S. A. WEISSENBURGER

• And Christmas is Glamour for all of us, young and old. Service stations are now such an integral and accepted part of retail merchandising in this country that they are missing something by not joining with other merchants in their community in putting Glamour into Holiday trading. Some practical suggestions as to gift offerings service stations can make, by an old hand at retail merchandising, in the Nov. 24th issue of N.P.N.

Prosecution Rests Its Case Nov. 12

with making purchases. That is, they said that it listed purchases in East Texas by companies charged with participating only in the alleged Mid-Continent program, and vice versa.

"For What They're Worth"

Judge Stone overruled the objections, all of which were made before the jury, and said the exhibits would be received "for what they're worth". The jury, he said, could determine their worth. The judge then asked the jury to "wipe out" of their minds the arguments that had taken place over their admission.

Walker continued his cross-examination of the witness, asking him if, in arriving at comparisons for purchases made by Louisiana Oil from refiners in south Arkansas he had used the *Oilgram* North Louisiana-Arkansas market quotations or the Oklahoma quotations.

Miller said he used the "Tulsa" quotations, and Walker asked that he make a similar tabulation of his company's purchases using the North-Louisiana-Arkansas market for comparison. Later, Walker agreed to withdraw this request if he could make a statement for the record concerning the markets. Government counsel did not object, and Walker read into the record the statement that *Platt's Oilgram* tank car prices for spot transactions in the North Louisiana-Arkansas area are usually from 0.5 to 0.75 cent higher than the Oklahoma market.

It was at this point, late in the afternoon of Nov. 11, when government counsel entered a number of stipulations in the record, and Chaffetz addressed the court:

"Now, before concluding the government's case . . . having finished with our evidence, the government desires to make certain motions. There are certain corporations and one individual as to whom the government desires to move to dismiss for the reasons I am about to state."

Then Chaffetz made the first government motion for dismissal, concerning Tide Water Associated, asserting that the evidence shows the activities charged by the government were carried on by Tide Water Oil Co., which has since been dissolved. The government attorney said the evidence had not shown the Tide Water Associated Oil Co. to be connected up.

Next motion was to dismiss Deep Rock Oil Corp., on the ground that that company was in the hands of trustees appointed by the court during the period covered by the indictment, and "we are satisfied that that corporation cannot be held legally liable in this case."

Then came the motion to dismiss Louisiana Oil & Refining Co., as "the corporation is no longer in existence . . .", followed by motion to dismiss Cities Service Export Oil Co. on the ground that it was merged with certain other companies, and is no longer a corporate entity.

All Granted

All these motions were granted as moved, as the crowded courtroom listened to see who would be "next."

"As to the Journal of Commerce Publishing Co., W. C. Platt Company, National Petroleum Publishing Co., and Warren C. Platt, the government feels it has been unable to adduce sufficient evidence to connect up these defendants with the conspiracy charged in the indictment; and the government respectfully moves to dismiss as to those several defendants."

Before Judge Stone could rule on this motion, William A. McAfee, counsel for the Platt defendants, was on his feet objecting.

"Your Honor, we wish to be heard on this matter, and I suggest that perhaps the discussion is not appropriate to take place in front of the jury," McAfee said.

After the jury had been excused, McAfee said that he represented only the Platt defendants, and said to the court:

"It is a well settled law that, at this state of a criminal proceeding, a criminal case cannot be dismissed without consent of the defendant. We desire to stand on that right, and insist, right here and now, that this case proceed to verdict, directed or otherwise.

"In order to make our position perfectly clear, I make the following motion on behalf of these defendants:

"I move your Honor that the prosecution be directed to proceed in this case with the prosecution against these defendants; or, in the alternative, that the jury be instructed at the close of government's case to return a verdict of not guilty in favor of these defendants and each of them."

Here B. M. Webster, Tide Water attorney, made the same motion on behalf of Tide Water Associated, and pointed out that the government "has undertaken here for some six weeks to proceed against these defendants, and has used every means within its control to produce evidence which would justify an application to the court to permit them to go to the jury as against those defendants."

Here Chaffetz interrupted to ask both McAfee and Webster if they would be satisfied if the court granted the government's motion to dismiss over their objection, and McAfee retorted:

"If we object, we can't be satisfied."

"Verdict of Some Kind"

However, Judge Stone granted the government's motion. Just after he had granted it S. T. Lawton, Journal of Commerce counsel, said that "at this stage of the game, the government has the power, but I doubt if it has the right to dismiss the indictment," and joined in the objection of McAfee, adding that "the case should be allowed to go to the jury for a verdict of some kind, whether under the direction of the court or otherwise."

"If these defendants want to stay in the case, we won't object———" Chaffetz began, but Judge Stone interrupted, asserting:

"Well, I am satisfied, as far as the journals are concerned, both journals, there is no competent and substantial evidence in this record which would support a finding of guilty against them; and the motion of the government is granted, over the objection of those defendants."

McAfee then asked: "May the record show our exception?"

"There will be no question of being placed in second jeopardy," the court replied, and suggested to the Platt attorneys, McAfee and Maurice F. Hanning, that, since their clients had given bond, "there should be prepared a written order of dismissal." The order was prepared, and was signed by Judge Stone the following morning.

Under the law, dismissal under these circumstances is the same as if the court had instructed the jury to bring in a "not guilty" verdict.

After the government's dismissal motions had been granted, the prosecution moved that certain exhibits previously received as against only part of the defendants, or against those "which the record shows to have been connected with the conspiracy thus far," be received as against all defendants remaining in the case.

The motion was granted after considerable argument between opposing counsel, and court adjourned for the day, with government attorneys predicting an early close to their case the following morning.

Government Rests

Close of the government's case came, then, only 36 minutes after court reconvened on Friday, Nov. 12, and after Col. Donovan's second unsuccessful attempt to introduce the NIRA oil code and the President's executive order of Aug. 19, 1933, approving the code, as part of the evidence.

A few routine motions as to evidence and exhibits and their applicability to certain defendants were made and ruled upon when the session opened, and shortly afterward Col. Donovan addressed the court, recalling that when he had previously attempted to introduce the code and executive order the court had said to let it pass and bring it up later.

He then moved their introduction into the evidence as a part of the government's case, giving as reasons that testimony of government witnesses during the case has referred to "refinery allocations," the

S. O. Indiana Increases Prices To Meet Rates

CHICAGO, Nov. 15. — Standard Oil Co. of Indiana announced today that, effective Nov. 17, it will advance prices of refined petroleum products to reflect the permanent advance of 1 cent per cwt. in freight rates which railroads have announced to become effective Nov. 15.

All grades of motor gasolines, dealer and tank wagon prices, and naphthas, refined oils, tractor fuels and domestic heating fuels will be advanced, through the company's marketing territory, which comprises Illinois, Indiana, Michigan, Minnesota, Iowa, Missouri, Kansas, the Dakotas and Wisconsin.

At many points the advance will amount to one-tenth cent per gallon, but there will be numbers of points where prices will be unchanged, due to the fact that the freight rate is figured to only the nearest one-tenth cent per gallon as affecting product prices, the Standard says.

Flock Of Defense Motions Are Filed

Planning and Co-Ordination Committee, and Petroleum Administrative Board, and that many of the contracts introduced refer to the code. With these in evidence, the code itself is necessary to the understanding of them, Donovan argued.

Crawford replied, "we do not think they are admissible" and contended no foundation had been laid for their introduction, and that "they have nothing to do with this lawsuit."

Donovan's motion was denied, but the court said he would take judicial notice of the code and executive order during arguments on motions for dismissal, and the way was left open for renewal of the motion to put the code and executive order into the evidence later.

Shortly after this Crawford announced to the court "the government now rests" and court adjourned for the weekend, after Donovan said he would not have his motions to strike and to dismiss ready for presentation until Monday.

Motions Presented and Argued

With the opening of court Monday morning, Nov. 15, Col. Donovan, on behalf of all defendants still in the case, moved to strike from the record 362 documents submitted in evidence by the government. Donovan contended that none of the writers of the documents were shown to have taken part in the alleged conspiracy.

Donovan also asked that testimony of Carl O. Beroth, Chicago broker, concerning conversations with independent refiners about the alleged buying program in East Texas and the Mid-Continent be stricken. This testimony was admitted on proffer of the government to show that these independents were co-conspirators, and Donovan contended this was not proved.

The motion of Donovan also asked that testimony of John M. Bradshaw, Dallas commission buyer, relating to telegrams, teletype messages and letters, be stricken out, on the ground that these messages did not refresh the witness' memory, and that he was allowed to read portions of them into the record.

Several other motions supplemental to the general motion filed by Col. Donovan were made by other defense lawyers. One such was the motion of Frederick Wood, Sinclair attorney, which sought to have removed from the record all testimony of W. P. Jacobi, Socony-Vacuum buyer, as it affected the defendant J. W. Carnes, vice president of Sinclair. Wood said the testimony was inadmissable as against Carnes, as it dealt with conversations and acts done out of his presence, and without any other evidence connecting him with it.

All Lawyers File

After the motions to strike out evidence had been taken under advisement by the court, counsel for each of the 64 defendants remaining in the case filed to the clerk's desk to present their motions for dismissal, and Col. Donovan began the general argument on behalf of all defendants for dismissal and a directed verdict of acquital.

Donovan's argument covered four main points:

1. The Mid-Continent program, if any, did not unreasonably restrain trade within the meaning of the Sherman law, as interpreted by the courts.

2. The only program in East Texas supported by competent evidence is a selling program, organized by the independent refiners; and such program is clearly lawful. Even if there was a buying program in East Texas, then it is clear that such program did not unreasonably restrain interstate trade and commerce.

3. There has been a complete failure to prove the single general scheme or agreement alleged in the indictment.

4. Failure of the prosecution to establish any agreement concerning the trade papers, as is admitted by the government's motion to dismiss, constitutes a fatal variance from the allegations of the indictment.

As to the "unreasonableness" of the restraint of trade brought about by the East Texas and Mid-Continent programs, if any,

(*Continued on page* 29)

"Heat With Oil" Campaign Is Proposed To Institute

N. P. N. News Bureau

CHICAGO, Nov. 15.—A suggestion for a national co-operative campaign by the oil industry to promote oil heat, spending a minimum of $3,000,000 over three years, was made to the American Petroleum Institute at its annual meeting here last week by the Chicago Oil Heat Committee.

In a letter to Axtell J. Byles, institute president, Frank E. Spencer, Spencer Petroleum Co., chairman of the Chicago committee, pointed out that the proposed expenditure, when compared to amounts spent by oil companies on competitive gasoline advertising, "must appear wholly reasonable, if not pitifully small."

The proposal is for a three-year campaign, to start next spring. Each year's expenditures to co-operatively promote oil heating would be a minimum of $1,000,000.

National Group Proposed

The Chicago committee proposes that a National Oil Heat Committee be formed immediately "to represent fairly and intelligently the oil companies interested in heating oils, and the burner manufacturers." This committee would conduct the campaign.

President Byles's address at the first general session of the institute meeting acknowledged that heating oil now is a major oil industry product.

"Some, but possibly not enough of the institute members have been forced to recognize this position already," the Chicago committee's letter relates, "but the facts that exist and that prompted you to make that statement in your address will certainly cause all others interested directly or indirectly in heating oils, to form this same conclusion."

The letter continues by relating that the heating oil industry like "Topsy" just "growed."

To Educate "Topsy"

"Today some of us who have given this subject intense thought and consideration during the past few years," the letter to Byles continued, "believe a situation faces us (and I refer most especially to the oil industry) where we cannot expect this 'Topsy' like growth to continue indefinitely or satisfactorily.

"In other words, 'Topsy' has her growth and now must be educated and developed.

"No longer will the home owners of this country be charmed solely by the competitive arguments and offers made by the few responsible oil burner manufacturers still in business. Already the arch competitors of fuel oil for heating purposes (namely gas and coal) are alive to the situation, and are taking the play away from the oil and the oil burner industries, each by banding together in effective local and national campaigns, where they are telling their stories collectively, economically and successfully.

"Unless the responsible leaders in the oil industry, together with the responsible oil burner manufacturers can and do band together for the purpose of a national co-operative advertising campaign, extolling the advanages of 'oil for heating purposes' the strong position that has been attained by the oil industry—without much effort or expense—will be lost.

Waited Too Long

"This is not merely an idle surmise, or a vague conjecture. Positive and indisputable evidence in this direction is already available at points where the effect of the co-operative efforts of the coal people (with their automatic stoker ballyhoo) or the plausible national advertising copy of the gas industry, has been felt.

"In the judgment of the writer and the Chicago Oil Heat Committee, which perhaps has given this subject more thought than any other organization in the country, we may already have waited too long to offset most effectively the national collective efforts of our arch enemies, coal and gas. Certainly we have waited long enough."

The Chicago Oil Heat Committee conducted a campaign in metropolitan Chicago during the winter of 1935-1936 with a $34,000 expenditure. At that time gas was being intensively promoted for heating and the coal industry was defending its market in Chicago.

To Aid Consumption

Spencer has long viewed a co-operative campaign as a means of the oil industry building a market for one of its major products, and to increase the total volume of heating oil consumed.

In the letter to Byles reference is made of the oil companies expenditures for competitive gasoline advertising (amounting to about $25,000,000 annually). Spencer views this gasoline advertising as being competitive, in not increasing the total consumption of motor fuel but endeavoring to win motorists from one brand to another, as against a possible co-operative campaign by the industry to increase total heating oil volume.

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Thanks To My Friends, Now For the South and Golf

By WARREN C. PLATT, Editor

CLEVELAND, Nov. 15. — Acquitted, free and home again, from the biggest and weirdest legal battle, I believe, in this country's history.

The trial at Madison continues. In the meantime, I am packing my wife and golf clubs into the car and cruising a few hundred miles away from the snow that has started to blow and even from all gossip of the Madison oil case.

I am going to try and not give that case another thought —I certainly have had nothing much else on my mind for a year and a half—until the case is finished. Then I will pick up the transcript of the record, from the filing of the indictments to the final verdict; I will sort out all the notes on "inside" and "backstairs" information I have been accumulating and then write the REAL story of that case.

It will be a story that every oil man and every business man and citizen should read and understand, because the manner in which this case has been conducted warrants the most serious consideration of all honest men. It has raised the greatest doubts as to the relationship that can and should exist between business and government.

However all that may be, right now I say thanks to all my friends for their kind wishes and most able and generous assistance to me in the preparation and carrying on of my case,—friends I am glad to say from every branch of the oil industry.

My particular thanks to those refiners and jobbers who gave so freely of their time and data to prove that *The Oilgram* and NATIONAL PETROLEUM NEWS during 1935-36 had done, as it always had prior thereto and has done since, a most accurate, up-to-the-minute and honest job of price reporting.

While the government attorneys did not even say they were sorry for all the inconvenience, expense and trouble they have needlessly and unjustly caused me these past two years, at least one thing I will get out of this trial. That is absolute proof of the exceedingly accurate reporting we have done of tank car prices everywhere. The evidence of that is simply tremendous and irrefutable. This data will be available to the public when Defense Counsel Donovan completes presentation of his case.

For the present I will see what I can do with those rusty golf clubs.

New Rates Will Boost Water, Truck Transportation

With the railroads planning for another early 15 per cent increase in all freight rates, the question arises if the roads have not finally decided to give up all effort to hold the business of the petroleum industry. Certainly with rail rates going up and pipeline, barge and truck transportation going down in cost, the roads cannot hope to increase their tonnage with still higher rates.

Perhaps the railroads plan to try to hold up or even raise trucking costs and rates by more stringent regulations under the federal motor truck control law, and perhaps the roads plan some such cost raising regulations for water transportation.

Such plans, if the roads have them, cannot be expected to prevail for, no matter how much the railroads and some truck owners try to force regulation of trucks and water ways, the fact remains that truck and water way transportation is essentially a private, individual and small man's transportation. No large investment of capital is required in either. No big organization is needed to operate them. Motor truck manufacturers every year are making their trucks lighter, cheaper, more economical to operate and more efficient in handling big loads. They are also making those trucks easier for the small man to buy through time payments.

The development of water transportation methods is just as free as the water itself. Plenty of companies are building barges and plenty more are willing to try. Some individuals have even done the job quite creditably and most cheaply themselves. It is hard to believe that the railroads, should they wish to, could hamper the development of water transportation enough to protect their prospective high rates on petroleum products.

As to pipelines, the more the railroads fuss with them the more they will attract attention to the pipelines and their present rate structure with the undoubted result that the pipeline rates will be decreased. Meanwhile, the higher rail freight rates for distributing gasoline from the terminals of pipelines and refineries will just force the laying of more small local distributing lines, such as the Standard of Ohio is building from its refinery at Cleveland to Akron and Canton and from its Toledo refinery down through many small cities south of that point.

It is easy to foresee that the day is coming when even some well located and large gallonage service stations will be supplied by direct laterals from gasoline pipelines that will form more of a network over the country. The only deterrent to this development will be still more efficient trucks and, in country on navigable streams, better water transportation of petroleum and its products.

The railroads by this last proposed big advance in rates would seem to be digging their grave a little deeper so far as even holding much of their present oil tonnage is concerned.—W. C. P.

Next Step, A Consulting Pumper As A Director of the Institute

(A Letter to the Editor from Ellick Botts, consulting pumper, Gray Horse, Okla.)

To the Editor:

Reports have reached me that the boys had their usual good time in Chicago at the A. P. I. meeting and that there were the usual number of instructive speeches. I was sorry that I could not make it this year but you know how these planetary transmission cars are. Mine, I am afraid, has about reached the end of the trail and I am temporarily immobilized. There seemed to be nobody making the trip from here except by train. Oil men are modest that way, as you know; they seem to regard the use of their own products as a form of boasting.

So, having no transportation, I didn't get to the big meeting and most of my news about it came secondhand and even worse. It was especially gratifying to hear that the oil scouts have been given recognition and that one of the number is now a director of the A. P. I. The big boys are slowly working things around my way and in time the consulting pumpers will reach the pinnacle of petroleum fame. As I am the only one of that class the board of councillors should make short work of selecting somebody to be director.

Having that scout on the board is certain to result in great good to the industry. As you know, we have had some trouble around these A. P. I. conventions in finding out just what the directors talk about when they go into their huddles with a couple of big, tough birds on the gate to see that nobody accidentally pauses within earshot to tie his shoe or light a cigaret. Now the scouts are supposed to turn in everything they hear or even suspect at the weekly check-meeting. The one who is a director is under some kind of oath to do this and every scout's weekly letter should reflect quite accurately all conversations that occur within the holy temple.

Now, I have never bothered much about the directors' sessions while at A. P. I. meetings, contenting myself with the pre-digested statements which Vic Scales, the triple-threat public relations man serves to press and public whenever a resolution is emitted from the board room. My own opinion is that these discussions run about like this:

1st Director: Now, gentlemen, I think we should consider the matter of unnecessary drilling. We have been drilling too many wells the past year and true conservation is not being promoted by such conduct. I move that we adopt some kind of resolution, making it retroactive, and appoint a committee to work out the details.

2nd Director: Yeah, who are you to talk? Who busted a hole in the middle of my block in Sassafras county and started four wells, making me drill 25 more?

1st Director: That was different. My engineers told me the bottom hole pressure in that structure was too high and should be relieved or the oil would migrate into the upper sands. I drove out there myself and looked it over before we ever staked a location.

3rd Director: What kind of car are you driving now, Z. B.?

1st Director: Oh, just a little domestic job the boys gave me when I won the company golf championship.

4th Director: Phew, is that something! I've seen you in action. Do you still play with that 46 handicap? Why don't you let your company give the prize to the best golfer?

The Chairman: Gentlemen, we started to discuss drilling.

1st Director: I renew my motion, if it is in order. I think we should appoint a committee of the board to consider what steps should be taken.

So, there shortly appears a resolution dealing vigorously with the subject.

Maybe I am wrong but I have the idea that there is quite a lot of small talk like that. Anyway, we shall know next time. With that scout on the board passing it all along to about 300 other scouts each of whom will put it in a weekly letter which will be read by say five others, the news from the directors' room should soon be in general circulation. I am assuming, of course, that the scout-director will live up to his responsibilities to his own craftsmen. If he holds out on them, the National Oil Scouts Assn. will doubtless take appropriate action.

Yours truly,
Ellick Botts, Consulting Pumper and running for director.

Kill Profits Tax Now, Save '37 Earnings, Oilmen Demand

N. P. N. News Bureau

CLEVELAND, Nov. 15.—Repeal of the surtax on undistributed corporate earnings by the special session of Congress, which convened today, was urged by the Ohio Petroleum Marketers Association, Inc. The oil association transmitted today to Ohio congressmen a resolution against the tax.

"We are urging that action be taken at the special session, rather than being delayed until the regular session in January, so that this tax will not be imposed upon 1937 corporate incomes," Hubert B. Fuller of Cleveland, counsel for the association, said.

The resolution condemning the federal tax on undistributed corporate profits was adopted by the board of directors of the Ohio Petroleum Marketers Association late last week. Copies were mailed today to Ohio congressmen and senators, urging that action be taken at the special session.

The resolution deplored the tax as discriminatory against small corporations; as placing a heavy burden upon profits devoted to the payment of indebtedness; as penalizing improvement and expansion and, consequently, additional employment. Text of the resolution follows:

WHEREAS, the federal law imposing burdensome taxes on undistributed profits of corporations has now been in effect for a period of time sufficient to demonstrate its effect upon business operations, and,

WHEREAS, it has been amply demonstrated that in practice such law imposes a discriminatory penalty upon small corporations which have been unable to accumulate even moderate reserves or surpluses as compared with large corporations which have accumulated such reserves or surpluses in former years, and,

WHEREAS, most small and struggling corporations were forced to contract obligations in order to finance their operations during the period of the depression and thereby to continue in business, and the said statute places a heavy burden even upon profits devoted to the payment of such corporate indebtedness, and,

WHEREAS, such statute grants no exemption from taxation to profits devoted to either necessary corporate improvements or plant expansions and thereby penalizes and prevents such improvements and expansions, and,

WHEREAS, the failure of corporations to install such improvements and undertake legitimate and proper expansions has necessarily served to impair their ability to employ additional men and thereby diminish the army of unemployed in the United States and reduce the enormous appropriations for relief by both state and federal governments, and,

WHEREAS, the repeal of said tax law will materially contribute to the prosperity of smaller corporations throughout the country, will enable them better to compete with large corporations with established reserves and surpluses, and will encourage increased employment and thereby promote the revival of prosperity.

NOW, THEREFORE, the Ohio Petroleum Marketers Association, composed chiefly of small corporations engaged in the marketing of petroleum products which have been handicapped by the operation of said law, does hereby respectfully request the senators from the State of Ohio and the several members of the National House of Representatives from the State of Ohio to exert their utmost efforts to secure the repeal of the federal tax on undistributed corporate profits.

AND BE IT ALSO RESOLVED, that the secretary of the association be instructed to forward a copy of this resolution to each of the senators and members of the House of Representatives from Ohio with the request that they co-operate to secure the repeal of said statute at the earliest possible date.

President Resigns

BOSTON, Nov. 15.—Frederick F. Hale, Hale's Oil Co., Cambridge, Mass. has resigned as president of the Oil Men's Assn. of New England. Hale was elected president in January, 1937 and has devoted considerable of his time to the work. He will continue as a director of the association, it was stated.

No successor has been elected, the administrative duties being handled by the board of directors for the present. George E. Young will continue as executive secretary.

Oil Tax Burden Theme of A.P.I. Annual Meeting

(*Continued from page* 17)

industry's attention the need for curtailment of gasoline production over the winter and the imminent investigations by governmental authorities, state and otherwise, the theme of taxation began unfolding.

"Tax Obscures Trend"

Advances in producing and refining were reviewed by George A. Hill, Jr., of Houston, Houston Oil Co. of Texas, and the industry was reminded that, while the retail price of gasoline, ex-tax, has declined about 50 per cent from 1920 to 1937 the "constantly mounting tax impositions have obscured this trend."

The theme continued to the second general session Nov. 11. Dr. E. H. Howe, of Washington, editor of Industrial and Engineering Chemistry, in speaking on the significance of petroleum research, noted the oil industry's tax burden is heavy.

"Much money, perhaps 10 to 12 million dollars a year, is spent by the industry in furthering scientific research with a view to improved products and lower costs to the public," said Dr. Howe, "but, regardless of such achievements as we have related above, we cannot keep up with the tax collector. . . . . .

"Neither the petroleum industry nor the motorists complain over-much of the use of gasoline taxes for highway construction and maintenance; but when one-sixth of state motor taxes is used for non-highway purposes, we begin to see how this so-called painless method of taxation is being employed at every opportunity to obtain funds collected at the expense of the filling station for a wide variety of unrelated purposes."

Collett Asks Repeal

J. D. Collett, of Fort Worth, O'Keefe & Collett, claimed that the little business man bears the brunt of the undistributed profits tax. Little businesses he related must be their own investment bankers in a large measure and have no ready access to the capital markets.

An immediate objective of the oil industry, he continued, should be the repeal of the undistributed profits tax.

Congressman Wesley E. Disney, of Oklahoma, commented "that the public mind is rapidly coming to the conclusion that the undistributed profits tax is too burdensome and is a deterrent to business" as the final speaker at the general sessions.

"The outright repeal of that statute is being urged, and, in lieu of repeal, it is suggested that a substantial part of the undistributed profits be permitted to be held by the corporation as a reserve against a rainy day," Congressman Disney continued.

"Give Business Its Head"

"Some suggestions have been as much as 40 per cent, some as high as 60 per cent. We don't make investments where there is an impaired capital and no surplus.

"I assure you that these suggestions will have the most serious consideration by the subcommittee. I, for one, want to make it plain that I believe that business should be given its head.

"It is planned that, after the subcommittee completes its work, there will be open public hearings before the whole committee on ways and means. Whether these hearings will be reached before the Christmas holidays can not be assured, as no definite determination has been made on that point," Disney said.

APIC Reports

A report of the American Petroleum Industries Committee, made during the general institute meeting, noted progress made in stopping diversion of gasoline tax funds to other purposes.

Five states, Alabama, Maryland, North Carolina, South Carolina and South Dakota, have abolished diversion amounting to about $6,000,000 annually, the report noted.

Other anti-diversion progress reported was in Alabama, California and Indiana, where initial steps were taken last year towards passage of constitutional amendments prohibiting misuse of automotive tax revenues. Through the federal Hayden-Cartwright act, under which the bureau of public roads may penalize states diverting highway funds, New Jersey stands to lose about $1,047,000 and Massachusetts $1,057,000 next year in federal aid, it was brought out.

Hits Local Diversion

The APIC report also noted that local communities receive some $265,496,000 annually as their share of the state gasoline tax collections, over the expenditure of which there is little control, and the committee recommended stronger control of expenditure of such funds to prevent diversion.

The industries committee reported diversion in 1936 amounted to about $169,344,000, or more than a third of the $419,552,000 of 1936 highway funds spent on construction and maintenance of state highway systems.

Byles, President And Other A.P.I. Heads Re-Elected

CHICAGO, Nov. 15. — All officers of the American Petroleum Institute were re-elected at the 18th annual meeting here last week.

Axtell J. Byles, New York, begins a fourth term as president. Other officers are:

Vice-president at large, K. R. Kingsbury, San Francisco, president, Standard Oil Co. of California.

Vice-president for production, George A. Hill, Jr., Houston, president, Houston Oil Co. of Texas.

Vice-president for refining, W. S. S. Rodgers, New York, president, The Texas Co.

Vice-president for marketing, C. E. Arnott, New York, vice-president, Socony-Vacuum Oil Co., Inc.

Treasurer, O. D. Donnell, Findlay, Ohio, president, Ohio Oil Co.

Executive vice-president, W. R. Boyd, Jr., of New York.

Secretary and assistant treasurer, Lacey Walker, of New York.

Assistant secretary, John S. Cooke, of New York.

Board Is Re-elected

Members of the executive committee, also re-elected, are F. A. Leovy, Gulf Oil Corp., Pittsburgh; J. Howard Pew, Sun Oil Co., Philadelphia; E. G. Seubert, Standard Oil Co. of Indiana, Chicago; H. F. Sinclair, Consolidated Oil Corp., New York; W. C. Teagle, Standard Oil Co. of New Jersey, New York; and R. G. A. Van der Woude, Shell Union Oil Corp., New York.

D. E. Buchanan, Hanlon-Buchanan, Inc., Tulsa, was re-elected chairman of the membership committee. Members are R. A. Broomfield, Barnsdall Corp., Los Angeles; E. J. Bullock, Standard Oil Co. of Indiana, Chicago; W. H. Ferguson, Continental Oil Co., Denver; and C. P. McGaha, Fain and McGaha, Wichita Falls, Texas.

APIC Group Re-elected

Members of the American Petroleum Industries Committee, re-elected are: H. T. Klein, The Texas Co., New York; J. J. Cosgrove, Continental Oil Co., Ponca City; P. M. Gregg, Union Oil Co. of California, Los Angeles; W. J. Guthrie, Gulf Refining Co., Pittsburgh; E. S. Hall, Standard Oil Co. of New Jersey, New York; W. A. McAfee, Standard Oil Co. of Ohio, Cleveland; G. V. Holton, Socony-Vacuum Oil Co., Inc., New York; and R. T. Osborn, Sinclair Refining Co., New York.

In the election of institute directors 46 were re-elected and six new members were placed on the board. Five of the six fill existing places. The sixth member brings the total number of directors to 108.

These six new directors are: Charles P. McGaha, Fain & McGaha, Wichita Falls, newly elected president of the Mid-Continent Oil & Gas Assn. of Texas, who was placed in the at-large group on the board; W. Alton Jones, New York, Cities Service Co., and W. Floyd Clinger, Tidioute, Pa., president of the Clinger Oil & Gas Co., and of the Pennsylvania Grade Crude Oil Assn., Oil City, both of whom were elected also to the at-large group, filling existing places. C. S. Jones, Los Angeles, Richfield Oil Co., elected to the production group; John M. Crawford, Parkersburg, W. Va., of the Parkersburg Rig & Reel Co., to the supply group; and E. J. Henry, Philadelphia, The Atlantic Refining Co., to the at-large group, all of these also filling existing places on the board. Henry succeeds H. Wilkinson, of New York, Asiatic Petroleum Co., in the at-large group. Wilkinson's classification was changed to a member of the foreign trade group succeeding Richard Airey, also of Asiatic Petroleum Co.

Action toward limiting the number of directors is to be taken, and President Byles is to appoint a special committee for this work.

For the general committee of the divisions of production and refining, President Byles appointed 10 new members; and division members elected 40 to the committees. As the marketing division did not have any meetings, the general committee for this division was not elected.

1938 A. P. I. Meetings

CHICAGO, Nov. 13. — The American Petroleum Institute executive committee has announced the following institute meetings for 1938:

Mid-year, at Wichita, Kans., May 23, 24, and 25.

Annual, the 19th, at Chicago, Stevens hotel, Nov. 14 to 18.

Surplus Profits Tax Affects Small Oil Men First, Collett Warns A.P.I. Meeting

N. P. N. News Bureau

CHICAGO, Nov. 12.—Legislation, actual and proposed, as it affects the oil industry was discussed by J. D. Collett, independent producer of Fort Worth, in an address before the general session of the American Petroleum Institute convention here Nov. 11.

In his introduction he pointed out some of the accomplishments of the oil industry which should allow it to be rated high among the nation's economic and social assets and he deplored the "lackadaisical attitude" on the part of many individuals in the industry toward legislative matters.

"It is a good citizen of American industrial society", said Collett, referring to the oil industry, "and it ought to be treated as such by everybody concerned. Especially it ought to be treated as such by the oil men of the country themselves.

"They ought to be conscious of the high status of their industry and not only should they regard it as a duty and even as a privilege to defend it against legislative attack, but they should never feel called upon to apologize to anybody for following such a course.

"The oil industry fully deserves the best of treatment at the hands of society and every oil man should be thoroughly aware of this and should assume, as a matter of course, that such treatment is its due."

Hits Profits Tax

The undistributed profits tax and the proposal made by the administration at Washington, during the last session of congress, to repeal the percentage depletion allowance were discussed by Collett, the subject of whose address before the institute was, "Legislation as It Affects the Oil Industry." On these two measures he stated:

"All of you who had any experience with the undistributed profits tax last year know what new problems of a vexatious character that measure presented and the added burden it placed on the industry. It fell heaviest on the little fellows, the independent operators who have no ready access to the capital markets of the country and who, in large measure, must be their own investment bankers and provide the means for maintaining their capital structures, by accumulating such surpluses as they may.

"This tax, of course, was not directed at the oil industry alone, but I think it is true that, by being added to the tax burdens which the oil industry already was bearing, it was almost in the nature of the straw that broke the camel's back. The repeal of this tax in its present form is recognized as an urgent need, so far as the oil industry is concerned, and this is one of the objectives toward which we must work. But hardly had this new burden been laid upon us, when we found our industry accused of tax-dodging because of the percentage depletion allowance, and the proposal to repeal that allowance now constitutes a new menace to the stability of the industry.

Depletion Allowance Sound

"I will not attempt to elaborate the sound principles on which the whole idea of a depletion allowance is based. Those principles are so well established, as they relate to the oil and mining industries, and they have been so long and so generally recognized, that one would think that they could not possibly be brought into question before any legislative body at this late day. It is undeniable that the extraction of petroleum or of any other mineral is in its very nature a process of depletion. On no sound basis could the proceeds of such a process be regarded as income pure and simple, in the sense that the return on capital invested in any other kind of an enterprise is income.

"Any operator who expects to stay in business understands that every barrel of oil he extracts from a lease leaves that much less in the ground and, that so far as that lease represents his capital, he is reducing it all the time. He must recognize that he is using up his capital. If he does not recognize this, but treats the proceeds of the oil he extracts entirely as income, he will soon find his capital depleted. Now, our revenue laws are designed to levy taxes on income and not on capital, and if no allowance were made for depletion in income tax returns on the proceeds of produced oil, and if the government insisted in treating it all as income, such taxation would amount to confiscation, because it would be in very fact the appropriation of part of the operator's capital.

"The percentage allowance has worked well. It has been fair and equitable to all—to the government first of all, and to the big and little operator alike. The older methods were especially unfair to the small operator, and I do not hesitate to say that anything that works against the small operator is against the best interests of the entire industry."

Anything that works against the interests of the small oil operator is against the interests of the entire industry, Collett told his audience. Both the undistributed profits tax and the proposed repeal of the percentage depletion allowance work against the small operator most of all, he said.

Another matter in which the rank and file of the oil industry should take more interest, Collett said, is that of making the Connally "hot" oil law a permanent statute.

This law, he stated, provided the kind of federal regulation of industry that is right and proper and that serves both society and the industry regulated. It has been extended for two years but should be made permanent, Collett said.

The Biermann bill, which provides for the divorcement of marketing operations from other operations in the oil industry, he said had no appreciable support from the oil industry at large.

"Sizing up the whole situation and considering all that this bill seeks to accomplish, I cannot look upon it as anything more than an effort on the part of a very small minority to take a grudge dig at some of the major companies," he said.

The proposal which was before congress to place the matter of stream pollution under the complete control of the federal government is of vital interest to the oil industry and should be resisted by all oil men, Collett stated.

Stream Pollution

Collett referred to the measure introduced in congress asserting that the U. S. is the owner of submerged lands, below low-water mark, and within the three-mile limit, lying along the coast of the U. S. "It directs the attorney general to institute and prosecute appropriate proceedings to establish the title and possession of the U. S. to such lands and the petroleum deposits thereunder and to eject all trespassers, etc.," he said.

"That the several states are the owners of the coastal areas within the three-mile limit is as definitely and positively established as any legal proposition can be established. I cannot believe that, after having recognized all these years, the title of the coastal states to their respective submerged lands, that the congress of the United States will now, by passing this resolution, cloud the title of the coastal states, and of their vendees, to these areas. It can't happen here," Collett stated.

Oil Industry Is Good Citizen

CHICAGO, Nov. 12.—It is easily demonstrated that, by whatever standard such things may be measured, the oil industry can be truly said to be a pre-eminently good citizen of American industrial society, said J. D. Collett, independent oil producer of Fort Worth, in addressing the American Petroleum Institute convention here Nov. 11 on "Legislation As It Affects The Oil Industry."

"In every one of its various capacities it passes the most rigid of tests," Collett said, "as the custodian of a vast amount of the invested capital of the American people; as the agency applying this capital to the development, the administration, and the conservation of one of the nation's most valuable natural resources; as a social servant providing society with primary and essential commodities efficiently and economically; as a taxpayer contributing more than adequately to the support of the various governments under which it exists; and, finally, as a fair, liberal, and even a humane employer of labor. In all of these capacities the American oil industry maintains standards that are second to none."

Leader At Washington Needed By Oil, Disney Tells Institute

CHICAGO, Nov. 15. — No one by position and personality has risen as the petroleum industry's leader in the eyes of official Washington, so Congressman Wesley E. Disney, Oklahoma, told the American Petroleum Institute in an address Nov. 11 at the 18th annual meeting in Chicago.

Congress by this situation is somewhat driven to act as an umpire between conflicting oil groups, he said. If the industry took an unbiased, non-partisan view of the whole situation an authority could emerge of sufficient strength and voice to avoid difficulties within the industry so well-known to the entire country.

"In Washington," Disney said, "when matters involving the railroads, whether about rates, pensions, retirements, bonds, loans, or whatnot, official and unofficial Washington mentally picks up the telephone and calls one man, placed in the nation's capital by enlightened selfishness—not as a super-lobbyist, but as a specific aid to that industry. The railroads have learned their lesson, although somewhat late, for their best interest. Official or unofficial Washington knows where to look when the moving picture industry is involved, and so on.

"But when someone asks me who represents the oil industry in Washington, my answer must necessarily be indefinite. It is a divided camp. So of course these great mistakes, involving millions in dollars and everything in reputations have been recurrent — to the detriment of the third largest industry in the nation.

"My answer is that the independents are represented by a certain group, and the majors by another. But no one represents the oil industry. No one who has, by position and personality, sufficient prestige to be looked upon as the final, decisive word in matters of business or policy, where the industry is involved.

"There exists in the nation's capital no firm hand of authority upon which officialdom and the divided interests in the oil business can rely and respect to the extent of heeding his judgment and obeying his command. No one with prestige enough to say 'Yes' to one group and 'No' to the other, or to say 'No' to both, and to speak equally wisely and firmly to public officials. No one to lay plans for the future, to avoid these debacles or iron out the difficulties when they arise, or to clarify difficult situations before they become impossible.

A Serious Situation

"I view this as a most serious situation, and at the same time an anomalous one. Congress is somewhat driven to acting as umpire between your own conflicting groups. Cohesion usually arises as a matter of necessity. If you should take an unbiased, non-partisan view of this whole situation, taking complete inventory of your interests and necessities, out of this collaboration could emerge an authority of sufficient strength and voice to avoid the situations now so well known to the entire country, and to your own detriment," he said.

Depletion Discussed

The Tulsa congressman also discussed depletion allowances and the efforts of the Treasury Department to revise this provision and President Roosevelt's tax message last session terming depletion "tax avoidance."

In the course of his address, Disney developed the following points:

"First, we cannot repeal the depletion clause in whole.

"Second, to return to discovery depletion would be undesirable from all standpoints—undesirable for both the government and the taxpayer.

"Third, to reduce the percentage would be wholly unfair.

"Fourth, to deny the allowance when the well is paid out would place a tremendous penalty on the industry. That would not be visited in the main on the larger companies, but on the smaller adventurer and the wild catter who has always led the vanguard for the discovery of new pools."

Name Committee To Study Fuels

N. P. N. News Bureau

CHICAGO, Nov. 15. — A committee on motor fuels, to collect, analyze and make available to the industry and the public information on present and future motor vehicle fuels, was announced last week at the American Petroleum Institute annual meeting by President Axtell J. Byles.

The committee is to be a clearing house for economic and technical data and will undertake studies to determine possibilities and necessities of motor fuel research, as well as procedure to follow in further investigations.

Scope of the committee's work will include experiments and experiences abroad, as well as information available in this country from oil and automotive companies. Studies will cover well known petroleum fuels, also admixtures containing alcohol, benzol, wood gas, and oil fuels from coal.

The committee's work will undertake to supplement and assist activities by consumer and government groups.

Reynolds Is Chairman

Conger Reynolds, of Chicago, Standard Oil Co. of Indiana public relations director, was named chairman. Arnold Daum, of Chicago, was named secretary. Offices will be at 616 S. Michigan Ave., Chicago.

Committee members are D. T. Pierce, New York, Consolidated Oil Corp.; P. H. Patchin, San Francisco, Standard Oil Co. of California; K. G. Mackenzie, New York, The Texas Co.; Graham Edgar, New York, Ethyl Gasoline Corp.

Northrop Clarey, New York, Standard Oil Co. of New Jersey; T. D. Peace, New York, Shell Union Oil Corp.; W. B. Plummer, Chicago, Standard Oil Co. of Indiana; L. C. Beard, New York, Socony-Vacuum Oil Co.; B. E. Sibley, Ponca City, Continental Oil Co.

F. A. Howard, New York, Standard Development Co.; Dr. Gustav Egloff, Chicago, Universal Oil Products Co.; G. G. Oberfell, Bartlesville, Phillips Petroleum Co.; and J. C. Welliver, Philadelphia, Sun Oil Co.

Pipeline Tax Committee

NEW YORK, Nov. 15.—Appointment of a pipeline transportation tax committee has been announced by the taxation subcommittee of the American Petroleum Industries Committee. Clayton E. Turney, The Texas Co., is chairman, with Stafford Smith, Socony-Vacuum Oil Co., and John M. Dressler, Standard of New Jersey, as the other members.

Principal objective of the committee, the announcement said, is to co-ordinate efforts of various oil companies to secure "reasonable" interpretations of the federal tax on pipeline transportation of crude and products.

Highest Safety Award Is Given To S. O. Indiana

N. P. N. News Bureau

CHICAGO, Nov. 15. — The American Petroleum Institute's all-department certificate for progress last year in accident prevention work was won by the Standard Oil Co. of Indiana.

Accident prevention awards were made here last week during the institute's annual meeting.

Indiana Standard's record covered 27,000 workers in all departments of the parent and subsidiary companies, with only 4.11 disabling injuries per million hours worked and only 0.96 days lost per 1000 hours worked.

The following departmental certificates for accident prevention work were awarded last week:

Refining: Union Oil Co. of California, Los Angeles; Standard Oil Co. of Louisiana, Baton Rouge, La.; Magnolia Petroleum Co., Dallas; American Petroleum Co., Houston; and General Petroleum Corp., Los Angeles.

Wholesale marketing: Continental Oil Co., Ponca City, Okla.; Standard Oil Co. of Indiana, Chicago; Standard Oil Co. of Nebraska, Omaha; and Moreland Oil Corp., of Delaware, Detroit.

Retail marketing: Cities Service Oil Co., Chicago, and Standard Oil Co. of Nebraska, Omaha.

Wholesale and retail marketing: Houston Oil Co. of Texas, Houston and Magnolia Petroleum Co., Dallas.

Drilling: Continental Oil Co., Ponca City; Humble Oil and Refining Co., Houston; and Chanslor-Canfield Midway Oil Co., Los Angeles.

Production: Continental Oil Co., Ponca City; Stanolind Oil & Gas Co., Tulsa; Tide Water Associated Oil Co., New York; Chanslor-Canfield Midway Oil Co., Los Angeles; and Panhandle Refining Co., Wichita Falls, Texas.

Natural gasoline: General Petroleum Corp. Los Angeles, and Shell Oil Co., San Francisco.

Oil pipeline: Union Oil Co. of California, Los Angeles; Ajax Pipe Line Co., Tulsa; and Houston Oil Co. of Texas, Houston.

Gas pipeline: Oklahoma Natural Gas Co., Tulsa.

Marine: Colonial Beacon Oil Co., Boston, Mass., and The Texas Co., New York.

Trend To Higher Octane Aviation Fuels To Remain

N. P. N. News Bureau

By ARCH L. FOSTER
Technical Editor

CHICAGO, Nov. 15. — The present trend of the aircraft industry to fuels of 100 octane number and higher is not an "unjustifiable whim" of that industry, but is the inevitable progress toward the use of more efficient fuels, aviation authorities pointed out at the American Petroleum Institute meeting here last week.

This trend involves the use of synthetic blending agents and fuels which many refineries cannot now produce economically; but those refineries who consider this trend as an unsound development would seem to be due for a rude awakening, as one authority stated it.

Of the nine billion gallons of polymer gasoline which can be made in this country now by polymerization methods, a billion gallons may be converted to iso-octane for the new super fuels, it was stated. Other synthetic hydrocarbons can be produced at not too high cost it is believed, which will show octane ratings of 100 or higher. One of these mentioned is 2,2,3-trimethylbutane, closely akin in molecular structure to iso-octane, which is 2,2,4-trimethylpentane.

The production on a commercial scale of iso-octane is an accomplished fact, and the capacity now operable or building for its production is considerably in excess of our requirements for the immediate future, it was said. By the so-called "Hot Acid" process developed by Shell Development Co. in California, the yield of iso-octane of 98-100 octane number has been doubled, over that of the older "Cold Acid" process used earlier.

Constituents of Petroleum

The hot process converts essentially all the isobutylene to iso-octane, which is hydrogenated mildly to iso-octane. However, no details of the hydrogenation method were announced during the meetings, except that pressures of 200-250 pounds are used by one company.

A dollar's worth of Mid-Continent straight-run gasoline can be made to return $1000, by recovering in pure form the five normal hydrocarbons, n-hexane to n-decane, which can be separated from this fraction, F. D. Rossini, of the U. S. Bureau of Standards, stated, in presenting at an institute technical session the summarized results of the last ten years' research by that laboratory on the constituents of petroleum. This valuation is calculated in terms of the commercial price of these pure hydrocarbons, Rossini stated.

The petroleum chemical industry is now using methane, ethane, propane, n-butane, isobutane, normal and iso-pentane, ethylene, propylene, and normal and iso-butenes to produce alcohols, glycols, ethers, oxides, alcohols, esters, acids, aldehydes, ketones, and numerous other products used commercially, some of them in large quantities. Higher molecular weight hydrocarbons are reported to be in commercial production in relatively pure form, to increase greatly the range of application of petroleum to the chemical industry.

1000 Compounds

The Bureau of Standards decade of research has isolated 45 hydrocarbons from the gasoline fraction of petroleum, Rossini stated. As many as 1000 different compounds may exist in gasolines from different crudes; the lubricating fractions offer the possibility of a much greater variety and complexity of hydrocarbons, since in the heavier cuts the molecular weights are many times those in the gasoline portion.

The bureau has separated some 600 very narrow-boiling fractions from the lubricating portion of Mid-Continent crude. The lowest boiling cut of this series has been found to consist mainly of molecules of about 28 carbon atoms and is made up of one-ring naphthene or cycloparaffins least soluble in acetone; the more soluble products are two- and three-ring naphthenes with differing side-chains.

Automotive Fuel Losses

Losses of automotive fuels by evaporation from the fuel system amounting to four per cent and higher of the fuel placed in the fuel tank were reported by T. W. Legatski and R. R. Couch, of Phillips Petroleum Co., who directed the Pawkuska, Oklahoma, road tests during the summer of 1937. Octane number losses of at least one number were found as a result of these volume losses. Since the most volatile portion of the fuel is lost, which portion is normally highest in octane rating, the reduction in octane number of the fuel which actually reaches the cylinders to be burned is easily explained.

A series of cars were operated in the road tests in summer temperatures, using four fuels. Two of these fuels were of the commercial type of five and six pounds Reid vapor pressure respectively; the other two were made up to 13.75 pounds vapor pressure by blending carefully fractionated butane with the two original fuels in the necessary proportions.

Very significant are the temperatures found in the fuel systems of 1937 cars during these tests as reported to the institute. Temperatures as high as 100 to 113 F. above atmospheric were found in the fuel systems of some cars and the wonder seems to be that the losses were not even higher than the averages shown. The procedure for determination of vapor losses worked out by the group under Legatski and Couch is believed to be a satisfactory and reproducible one and to give results comparable to loss values as experienced under similar driving conditions.

Driving cars at higher altitudes reduces the octane number of the fuel required for satisfactory performance, Neill MacCoull, K. L. Hollister and Roy C. Crone, of The Texas Co., New York, reported after an exhaustive test series which operated at sea-level, 5100 feet, 6000 feet and 12,100-feet elevations.

Operating cars requiring 69 octane number at sea-level, these investigators found that 52 was required at 5100 feet, 49 at 6000 feet, and 18 at 12,100-foot levels, on practically level roads. At the 12,100-foot level special carburetor jets were used, as recommended by the car manufacturers, and their use increased acceleration by 9% to 22%, and raised octane requirements by only 3 to 8 units. Change in octane requirements for cracked fuels was slightly less at altitudes than for straight-run fuels, they found.

Revise Refinery Census Methods

N. P. N. News Bureau

CHICAGO, Nov. 15. — The American Petroleum Institute directors, at the annual meeting of the institute here Nov. 9-12, recommended the simplification of the method of reporting refinery capacities and the capacities of cracking plants as made annually by the U. S. Bureau of Mines.

A new report form was also approved which includes figures on refining capacity and "cracked gasoline capacity" and which eliminates some data now considered to be unnecessary.

Simplification of this report has come as result of the efforts of refining executives to bring the report up to date and to eliminate from the government's figures on refining and cracking capacity, overestimates of capacity. The capacity estimates many have believed to be greater than the amounts of crude the industry can actually refine.

Formerly the industry has been credited with a daily refining capacity of more than four million barrels of crude per day, an amount far in excess of our total requirements, and a figure which is considered to represent a threat to stability in the industry and an unsettling effect on the future if this excess capacity really existed.

The simplification work has been carried on by a special committee of the institute in collaboration with bureau officials. Walter Miller, vice president of refining, Continental Oil Co., was the first chairman of this committee; N. E. Loomis was chairman later.

Two new definitions, for refining capacity and for cracking capacity, were formulated and will be included in the report blank sent out to refiners, it is understood. It is expected that the consideration of these definitions will promote greater uniformity in reporting capacities. These definitions are as follows:

"(1) By 'crude capacity' of a refinery is meant the maximum daily average crude throughput attainable under normal conditions with allowance for downtime, cleaning, inspections, repairs and breakdowns. Normal conditions imply contemplated grades of crude run for contemplated types of products finished to the extent customary to that refinery.

"(2) By 'cracked gasoline capacity' of a refinery is meant the maximum daily average of cracked gasoline attainable under normal conditions with allowance for downtime, cleaning, inspections, repairs, and breakdowns. Normal conditions imply contemplated grades of charging stocks run for contemplated types of products finished to the extent customary to that refinery. This figure should include total possible gasoline except for straight-run gasoline (not reformed) and natural gasoline used in blends. In the case of such equipment as combination units the cracked gasoline capacity should not include that portion of the straight-run gasoline content of the crude which is not reformed."

Method for Evaluating Structures for Oil Source Beds is Reported at A.P.I. Meeting

N. P. N. News Bureau

CHICAGO, Nov. 15

"Oil," runs the familiar saying, "is where you find it." The constant effort of production technologists for years has been to improve the ways of finding; to learn how to reject the places where oil isn't.

On this question Parker D. Trask, of the U. S. Geological Survey and director of American Petroleum Institute research project No. 4, reported at the institute meeting here last week something new under the alluring title, "One Way of Finding Oil More Cheaply."

What he has been working on for several years is the identification of source beds. Plenty of people are at work on ways of finding structure, but many a beautiful structure has nothing but dry holes. Speaking particularly of large stretches of territory in the U. S. which as yet have no oil fields, Trask said:

"At the present time much of this territory, however, is being prospected for oil; in fact, some of the places which are being considered are probably deficient in source beds. If the companies could tell by the analyses of well cuttings that source beds were lacking, they could save millions of dollars in further useless drilling.

"On the other hand, if the cuttings indicated that adequate source material is present in certain places, they could make their exploration campaign much more efficient by concentrating on those particular places. In other words, if the oil companies could recognize source beds as effectively as they can reservoir rocks and structural traps, they would certainly carry on their prospecting campaign more profitably."

Method Described

Several approaches to the problem of finding a reliable method of evaluating source beds were tried, it was reported, it being assumed, with some scientific basis for the assumption, that petroleum originated not far from the places where it is found in pools. The method which Trask believes will tend to eliminate considerable of the hazard from wildcatting, was described as follows:

"Petroleum. . . .is deficient in compounds containing nitrogen. Sediments in which the organic constituents are low in nitrogen, therefore, might prove to be source beds. . . . . The only property that is particularly encouraging is the nitrogen-reduction ratio. The nitrogen-reduction ratio is the ratio of the quantity of nitrogen in the sediments to the quantity of chromic acid the sediments can reduce. Chromic acid, when added to sediments, is reduced; i.e., it loses some of the oxygen it contains.

"A chemical reaction takes place whereby the oxygen that is given off by the chromic acid enters into the chemical combination with some of the constituents of the sediments and thus increases their oxygen content. Constituents that have thus been increased in oxygen content are said to have been oxidized.

"The chemical reaction whereby oxygen is lost from the chromic acid takes place only under the condition that the constituents of the sediments can increase their oxygen content. If they already contain much oxygen, little chromic acid is reduced; and if they have a low oxygen content, considerable chromic acid is reduced. Most substances that are oxidized in the sediments are organic compounds rather than mineral constituents; so if much chromic acid is reduced by the sediments, the organic constituents may be presumed to contain relatively little oxygen.

A Matter of Ratios

"As petroleum is composed of compounds that contain almost no oxygen at all, the sediments that generate it might likewise be expected to contain little oxygen. Since the quantity of chromic acid that is reduced forms the denominator of the nitrogen-reduction ratio, source beds, therefore, might be expected to have lower ratios than non-source beds. Also, as discussed above, a low nitrogen content seems to be a slight indication of the ability of the sediments to generate oil. Consequently, as nitrogen is placed in the numerator of the nitrogen-reduction ratio, low ratios should be expected even more strongly to be favorable indices of source beds."

Theory Tested

The theory has been tested in numerous places, Trask said. The ratio seems to be 65 to 74 per cent efficient. "It is still far from being thoroughly understood, although it does offer considerable promise," he said. "In fact, one oil company reports saving $100,000 in leases it would otherwise have purchased in the vicinity of a wildcat well had not the cuttings from the well had very high ratios. The well was located on good structure and ultimately proved to be dry."

Need for some method of reducing losses in exploratory drilling was illustrated by Trask in his report to the institute convention.

"In the United States we are now taking oil from the ground at a rate of more than one and a quarter billion barrels a year. At present we know where there are about 13 billion barrels of oil that can be produced by current methods of operation. This does not, however, represent our entire supply of oil, as we are finding new fields all the time.

"Thus far we have been able to locate as much new oil as is taken from the ground during the year. Can we keep this rate up? This year (1937) we shall probably produce about 200 million more barrels than we did last year. Shall we find that much more oil than we did last year? If so, we shall have to discover more oil fields than we did last year.

"There is just so much oil in the ground. All the oil that will be used in our lifetime has already been formed and is awaiting discovery. Each new field found, therefore, lessens the number yet to be discovered. The fields that are easy to find have already been located. The hard ones remain. Locating new fields costs a great deal of money. Last year at least 80 million dollars alone was spent on dry wells—on wells that yielded no oil—not to mention the cost of geological and geophysical exploration before the wells were drilled. . . . . ."

Pumping Deep Field

Problems of pumping the deep (6500-feet) wells in the Oklahoma City field were related by B. M. Moroney, Carter Oil Co., and F. R. Wheeler, Barnsdall Oil Co., both of Oklahoma City. They summarized advantages and disadvantages of the principal types of artificial lifts used in that field as follows:

"For producing at low rates of flow, hydraulic and sucker-rod pumping are in direct competition with one another. At high rates of flow the centrifugal pump is outstanding. In general, there is little actual difference in the three pumping methods mentioned as to cost per barrel produced. Some operators, however, claim lower-per-barrel costs with the hydraulic pump.

"The advantages of sucker-rod pumping are: It is simple in principle, and the present personnel is fairly familiar with the equipment. The disadvantages are: It does not fit all types of wells, such as crooked holes; service equipment and labor requirements are large; it requires considerable replacement of material; and has the low over-all efficiency of 27 per cent.

Hydraulic Pumping

"The advantages of hydraulic pumping are: It has low cost of installation and operation; it is generally adaptable to all types of wells of moderate and small flowing capacity; its efficiency is not affected by crookedness of holes; well conditions are easily determined by action of the pressure gauge at the surface; and it has the high over-all efficiency of 60 per cent. The disadvantages are: It requires trained personnel, and thoroughly cleaned power-oil; it is difficult to start in operation; and paraffin trouble is excessive.

"The advantages of centrifugal pumping are: It produces at high rates of flow. Disadvantages are: It cannot be economically adapted to wells of small capacity, nor to wells of large capacity which require handling of excessive quantities of sand or free gas; it does not deplete the sand as well as other methods; it has the low over-all efficiency of 36 per cent; furthermore, high-speed equipment is usually short lived."

Oil Field Emulsions

J. S. Surfluh, Los Angeles, Standard Oil Co. of California, discussed the principal causes of emulsions, said their origin can be ascribed to turbulence in wells, pumps, tubing, flow lines and transfer pumps. Generally, he said, emulsions can be prevented by reducing the degree of agitation, by producing physiochemical conditions unsuitable for emulsion formation and by separating the water before agitation takes place. The first named, he said, is the most important.

Some operators, said Surfluh, have effected greater economies on treating oil by eliminating emulsions than by improving dehydration methods and equipment during the last year or two.

Field Methods

L. R. Hodell, Tulsa, Carter Oil Co. told of technique used by his company in welding casing. The practice is relatively new, but is to some extent supplanting threaded and coupled casing. He said the "net result of welding casing is to make for cheaper pipe strings, with greater

joint efficiencies, which probably means a greater ultimate recovery of pipe; and probably most important to the producers nowadays, who are going to great depths and encountering high formation pressures, we should be able to have pipe strings which will not leak. It seems not unreasonable to believe that this combination of benefits to be had from the welding of casing will in the near future make for its very wide practice."

B. P. Kantzer and E. G. Trostel, Los Angeles, Union Oil Co. of California, offered at production sections of the institute meeting a well-performance terminology table which included symbols for the numerous terms used by the production engineer.

Methods of controlling free gas in oil wells to utilize the energy in lifting oil were described by R. J. Sullivan, Fairfax, Okla., Carter Oil Co. Numerous specific instances of control of high gas-oil ratio well were described.

"Operation and Maintenance of Multi-cylinder Gas Engines," was presented by H. R. Hogaboom, Los Angeles, Petroleum Equipment Co. His paper embodied recommendations of the California sub-committee on multicylinder gas engine maintenance.

C. J. Koberly, Huntington Park, Cal., of Kobe, Inc., discussed selection of screen openings for pipe set in loose, unconsolidated oil bearing sands.

Madison Record At 5206 Pages

MADISON, Wis., Nov. 16. — When the prosecution rested its case in the alleged oil conspiracy here Friday, Nov. 12, after dismissing eight of the defendants on trial . . .

The "record" in the case was 5206 pages long.

There had been 821 exhibits introduced in evidence.

Of the 104 witnesses which the government said it had called, only 35 had been put on the stand.

The case, which began Oct. 4, was six weeks old.

The remaining defendants numbered 64 — 19 corporations and 45 individuals.

Donovan Argues for Dismissal Motions

(*Continued on page* 21)

Col. Donovan pointed out that the Supreme Court of the United States has held repeatedly that the Sherman Act condemns only such conspiracies "as prejudice the public interests by unduly restricting competition or unduly obstructing the course of trade."

"No Central Buying Group"

The programs shown by the government, he contended, did not come within this ruling. If any program had been established by the government's case, he contended, it was a program wherein purchases were to be made only if the major companies needed the gasoline, and from refiners who had upon their hands distress gasoline. No evidence was shown, Donovan said, showing that there was any central or group buying.

The testimony of Jacobi, the attorney said, was the only testimony descriptive of the Mid-Continent program, adding that Jacobi had testified that purchases were voluntary. The function of the tank car stabilization committee was completed when it put the buyer who needed gasoline in touch with the seller who had gasoline to offer, he added, and the companies were acting in the spirit of co-operation fostered by the petroleum code.

As to the East Texas program, Donovan said the evidence showed it to be clearly a selling program "organized and run by the East Texas independent refiners who had gasoline to sell," and is "clearly the type of organization upheld by the Supreme Court of the United States in the Appalachian Coal case."

Donovan asked the court: "Can there be any doubt that the buying which began in 1935 had, as one of its reasons, the limitations imposed by the refinery allocations of the petroleum code? I think, your honor, that this evidence clearly tends to support the proposition that the buying program was an activity carried on by a committee appointed by the man designated to conduct it under the petroleum code."

On the third point in his argument, Donovan asserted, "I think there can't be any doubt that this indictment alleges in one count one general scheme to accomplish a particular purpose by carrying on two buying programs. Not only does the indictment say that but it has been repeatedly stated here by counsel that that is what they construe it to be."

The evidence, however, does not tie the two disconnected buying programs, (even assuming they had been shown) to be one general conspiracy, Donovan argued, adding: "It has been uniformly held that where one large conspiracy is charged, proof of different and disconnected smaller conspiracies cannot sustain a conviction. When such a situation is presented, a court should direct a verdict for the defendants."

"We are not being tried here on two indictments. This indictment does not allege in two counts two separate conspiracies to carry out two separate buying programs," Donovan said.

Going on to his fourth point, the defense counsel pointed out that the indictment called the trade publications the "chief agencies and instrumentalities through which the wrongfully and artificially raised prices for gasoline. . .have affected the price paid by jobbers, retail dealers, and consumers," and declared that "no step in the plan can be eliminated without causing the whole to collapse, for the indictment omits any other means or steps that might be availed of because of the existing failure of proof regarding the journals."

Donovan quoted from the opening statements of government counsel and from the indictment, and said "these quotations demonstrate that those who drew this indictment firmly believe that no conspiracy which operated in Wisconsin could be shown unless the evidence demonstrated an agreement involving the false and fraudulent publication between trade journals of the prices alleged to have been fixed by these defendants. There is no proof of any such participation by the trade journals. There is no proof of any agreement to use the trade journals for such fraudulent purposes."

Judge Stone here asked Donovan if it were not "quite possible" that the trade journals had unwittingly published the false prices, and that they could thus be eliminated from the structure of the government's case without causing its complete collapse.

No Agreement To Publish Prices

Donovan said this was not possible, in view of the way the indictment was drawn, and added "there is no evidence to show that these defendants fixed the prices published by the journals."

"Even if there was an agreement to purchase gasoline at fixed prices," he continued, it is clear there was no agreement to publish these prices in the trade papers" and that without such publication there could be no showing that jobbers in the Western District of Wisconsin, in the jurisdiction of the court, had been harmed by the alleged conspiracy.

Donovan said testimony of *Oilgram* witnesses made the record "clear as to what the journals did. They did know about the buying by major companies, and they published stories about it, but they published in their market columns only spot market prices paid by jobbers."

"The dismissal of the trade journals," Donovan declared, "vindicates us on a charge of price-fixing."

Donovan recapitulated his argument shortly after the luncheon recess, and W. P. Crawford, government counsel, asked the court that all arguments on motions to dismiss be made before the government's answer. It was decided to finish all arguments bearing on the general contentions outlined by Donovan before the government answered, and that motions to dismiss for the individual and corporate defendants separately be presented later.

Donovan was followed by Goldthwaite Dorr, Socony-Vacuum counsel, who recalled the testimony of Neil Buckley, Cities Service market observer, telling how he went to C. E. Arnott. Buckley went, not because Arnott was "president of Socony-Vacuum, but because he was stabilizer under Mr. Ickes" in the P. & C. Committee, Donovan said. He went on behalf of the independent refiners down in Texas who were trying to get away from illegal practices of "hot" oil.

Dorr recounted the meetings called, and said they had all been under the guidance of the P. & C. Committee, according to Buckley's testimony.

Then he referred to a chart showing prices paid by Jacobi for tank cars of gasoline and asserted:

"Jacobi was in the center of this thing, if anyone was. This chart shows he either bought at the published low or below the low. If the published prices of the journals had reflected the prices he paid, the upward trend of published prices would have been retarded, not accelerated."

Dorr also made the point that the Connally law was a vital factor in the price increase in early 1935, by stopping the flood of "hot" and "stolen" oil which had been used in the manufacture of the cheap gasoline.

T. P. Young, counsel for Shell,

'When Was Arnott A Public Officer?'

next to present an argument on the general motions to dismiss, prefaced his remarks to the court with a brief history of oil prices in the East Texas and Oklahoma fields since 1933, when crude was selling for 10 cents a barrel and gasoline 1.875 cents a gallon. He told of the efforts of the states, and eventually of the federal government to put an end to this low priced crude and gasoline, which was ruining business men, depriving the school funds of revenue, and destroying the country's natural resources.

Later all these efforts were able to get the price of crude up to $1 per barrel, but the price of gasoline, which should have been about 5.25 cents per gallon according to the ratio set forth in the code, stayed down around 3.5 cents, chiefly because large quantities of gasoline were being manufactured from illegally run crude, Young said.

Pipelines Tapped

Besides the large quantities of crude being produced from wells over and above proration, "hot" oil producers were subject to having their pipelines tapped without having recourse to state authorities, and much of the cheap gasoline came from oil literally stolen from the pipelines.

Finally, after the Connally Act was passed and signed, the second federal tender board moved in and prices began moving up to a "parity" through its efforts and the law prohibiting interstate shipment of gasoline made from "hot" oil.

After this introduction, Young declared, "We have no fear in this case, your honor, if the court will consider all of the facts—if we can get the court to a full appreciation of the whole story. The only thing we fear is that the government will be successful in its efforts to exclude from the court the whole story. They have made strenuous efforts to keep out of this record even the fact that Mr. Arnott was a public officer of the United States. They have tried their best to keep out of this record any reference to the buying programs of 1934. . . ."

Chaffetz here interrupted with, "When was Mr. Arnott a public officer of the United States?"

"When he was a member of the Planning and Co-ordination Committee, appointed by the President of the United States," Young answered, and, addressing the court, "the official position held by Mr. Arnott, and shown by the record, is a complete defense on the face of the present record."

"Was Mr. Arnott holding any public position in March of 1935?" Judge Stone asked.

"Yes, certainly," replied Young. "He was a member of the P. & C. Committee. All of these acts were done under his direction. . . .The government has been so careful not to bring that out, your honor, that I have sat here and listened to this evidence in indignation and surprise."

"The government, instead of indicating Arnott and alleging his office. . .have chosen to pursue the opposite course," Young said. "They have chosen to indict him, to charge him with high crimes, and never give him the benefit of the allegation, even, much less the proof that he was acting at least under color of his office all of the time that these acts were done."

"We deny that he was," interjected Chaffetz.

Then Young charged the government "carefully suppressed the evidence of their own witnesses, and said that many witnesses subpoenaed by the government were not put on the witness stand, and that many others could have been called who would have "thrown an enormous light on this question."

No Washington Witnesses

"Why is it that this prosecution hasn't brought a single witness from Washington?" he asked. "Why haven't they brought members of the P & C Committee, or any member of the Bureau of Mines, to testify? Throughout the whole trial of this case there hasn't been a word or a whisper that has reached the door of this court house from Washington."

Some of the witnesses subpoenaed but never put on the witness stand by the government were witnesses who had appeared before the grand jury, Young said. "They brought them here, talked to them, having heard their story, they told them to go home," he asserted.

"It is easy enough to take a witness before a grand jury, and then hector and browbeat him with question after question until he gets so frightened that he doesn't know what to do. . . .and they will say 'yes, yes, yes' to every question that is asked," Young went on, and then said the government put some of these same witnesses on the stand in the trial, and "when the witness does not know how to answer, they pull out the grand jury testimony and try to create the impression on this jury that every single witness they have produced here is a flagrant perjurer and a liar. It is the. . ."

Here Judge Stone interrupted, saying that he had a look at the grand jury testimony, "and I will say for your benefit that some of those statements that some of those witnesses made there certainly aren't consistent with what they said upon this witness stand."

And Chaffetz commented "You don't mean to suggest that all of these witnesses are lily-white truth-tellers on this stand here?"

Young countered by asking why the government didn't "put on your own witnesses, from Washington?" He answered the question himself:

"I know perfectly well why they didn't, because they know that the Secretary of the Interior's office, and the Bureau of Mines office, if they get any of them here, will testify against them."

"That is an out and out. . ." Chaffetz began, but Young went on:

"And I am entitled to tell the court that we appeal to the presumption of law against the man who suppresses testimony which is within his own power to produce, and which would throw some light on the controversy, on which as yet there has been little if any light thrown."

Under the theory pursued by the government attorneys in this case, Young said, "every man who participated in any code activity during NIRA could be indicted as a criminal."

Here the attorney read into the record the section of the NIRA suspending the anti-trust laws, and asserted "there can be no question that the defendants cannot be convicted if their acts were consistent with innocence . . .On the present record it seems to me it is clear that their acts were wholly inconsistent with any idea of guilt."

It was the "consciousness of innocence" that made it possible for the letters which have been brought into the case to be preserved in the company files, and made it possible for the government to get to those files and get the letters out "and then undertake to piece them together into a lurid story of conspiracy and crime."

Court recessed until 9:30 a.m. Tuesday, Nov. 16, while Young still was in the midst of his argument.

Young resumed his argument Tuesday morning, Nov. 16, following up the subject of aims of the NIRA, which, he said, were primarily to get industry and labor back to order. Naturally, he said, this meant increased prices.

The petroleum industry was only one segment of the general recovery program through which program the "industry eventually begins to do business at a profit" and gets indicted, he said.

Price curves for other commodities rose faster during the recovery era than that for gasoline, he asserted, and charged that the oil indictment was an "indictment of the entire recovery program."

Shell Letters Read

Then the attorney took up some of the Shell correspondence, read earlier in the trial, and said that the prosecution had used them largely to impute to the words "buying program" some sinister meaning. He quoted one of the letters which said, "Bourque is working on a buying program," and pointed out that the government was careful not to mention previous buying programs "urged and requested by the Secretary of Interior."

"Of course Bourque was working on a buying program. Everybody in the industry was working on some way to solve a well nigh unsolvable problem," Young said. There was no possible suggestion of any illegal intent in the Shell letters, he held.

'All in the Papers'

Then he took up the price reviews sent between Shell officials and read to the jury previously by government counsel. All information in these was gathered from the trade papers —there for anybody to read, he asserted.

Young was followed by Frederick Wood, counsel for Sinclair, who said the motions to dismiss should be sustained unless:

1. The government has made out a prima facie case of conspiracy under the Sherman Act.
2. The conspiracy is the one alleged in the indictment, and not some other.
3. The conspiracy is shown to have affected the Western District of Wisconsin.

Wood pointed out that the indictment makes this a "price fixing" case, but that the government has not established existence of any agreement to fix prices. No major company or individual, he went on, ever bound itself or himself to pay the so-called "recommended" price of the sub-committee.

The purchasing in the Mid-Continent was purely voluntary and not compulsory, both with respect to the amount to be taken and the prices to be paid,

he held. Taking up the chart prepared and explained by the government's accountant witness, W. J. Miller, he said that the wide variance of prices it showed had been paid over any period was a contradiction of the "uniformity" of prices which the indictment charges.

Not Buying Committee

The sub-committee appointed by Arnott, known as the tank car stabilization committee, was not a buying committee, the evidence shows, the attorney contended. Its function was to locate distress gasoline and to put buyers in touch with sellers.

Miller's chart, a government exhibit, showed the small quantity of gasoline being purchased above the "low" of *Platt's Oilgram*, particularly in March, April and May, 1935, which Wood described as the "critical period" when the tank car stabilization committee was meeting from week to week, he argued.

Although the government had the figures available, they did not offer any compilation showing the relationship between prices paid by the various defendant companies, or between these companies and other purchasers. This contradicts any charge that it was a "price fixing" agreement, he contended.

Even assuming that there was some evidence to support the charge that the prices were uniform, Wood said no evidence has been adduced to show the prices were "high, arbitrary, or non-competitive," as charged. The chart showed, he contended, that the big majority of all purchases of gasoline by defendant companies in the Mid-Continent were below the low, or at the low.

Wood also went into the Appalachian coal case, discussed during the November 15 argument, holding that the Supreme Court's ruling on that case "sustains the right of members of a distressed industry to try to get together" on price matters, when they will not adversely affect the public interest. Besides this, he argued, the Sherman law has not been violated by these defendants for the further reason that they were operating under the National Industrial Recovery Act during the period of the alleged conspiracy.

The oil industry was making every effort it could to stabilize itself, to get rid of chaotic conditions into which low-priced crude, "hot" oil, and other factors had thrown it, he asserted.

"It is the first time I've ever heard it suggested that violation of the Sherman Act would be predicated on any effort of the large units in an industry to aid their smaller competitors," he said, referring to the payment of going market prices for distress gasoline bought from independent refiners, instead of taking advantage of their distressed condition.

Wood continued his argument after lunch, recapitulating his points concerning the Mid-Continent program. He then launched into a discussion of the East Texas program, in which he said the evidence thus far marks this as a "selling program organized by the refiners" rather than any buying program of the major companies. This same point was made by Col. Donovan in his argument on the motions for dismissal.

Wood outlined how Neil Buckley, Cities Service market observer, who testified he aided the East Texas Refiners in attempts to market their gasoline, made numerous calls on major company officials in an effort to have them purchase the East Texas gasoline, according to the Buckley testimony.

His efforts, according to the testimony as digested by Wood, were not very fruitful, but he got a few individual companies to agree to take the East Texas gasoline.

"There is no evidence of con-

(*Continued on page 32*)

Motor Fuel Stocks Cut 226,000 Bbls. Past Week; Gas, Fuel Stocks Up

By Teletype
N. P. N. News Bureau

NEW YORK, Nov. 16.—With an increase of 13,000 barrels in daily average crude runs to refinery stills, total motor fuel stocks decreased 226,000 barrels the week ended Nov. 13, but gas and fuel oil stocks rose 87,000 barrels, according to the American Petroleum Institute. Capacity of reporting plants was about the same as the previous week, 81.5 per cent.

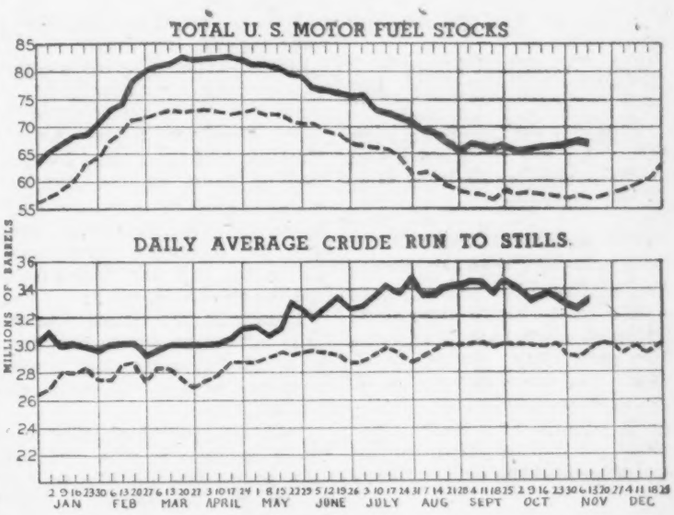
An increase of 18,000 barrels in Inland Texas refinery runs and one of 10,000 barrels in East Coast plants were offset by decreases of 14,000 barrels in California and 11,000 barrels in Indiana - Illinois - Kentucky. Oklahoma - Kansas - Missouri plants increased runs 11,000 barrels, with an increase of 3 per cent in plant operating capacity. Small changes took place in other districts.

The largest change of the week in motor fuel stocks was in the East Coast. Stocks here were reduced 450,000 barrels. Stocks in the Texas Gulf district, however, gained nearly 380,000 barrels. In the Inland Texas district they were increased 109,000 barrels, but a decline of 141,000 barrels was reported in Oklahoma-Kansas-Missouri. Four other districts reported declines, while two showed increases, these being in the far west.

Motor fuel stocks by location changed as follows: at refineries, gain of 280,000 barrels, to 34,091,000 barrels on Nov. 13; in-transit and at terminals, decline of 530,000 barrels, to 22,719,000 barrels; and unfinished gasoline stocks, gain of 24,000 barrels, to 6,595,000 barrels.

A. T. A. Intervenes

WASHINGTON, Nov. 16. — American Trucking Association has filed a petition to intervene in the 15 per cent rail freight raise case, so that it may ask for a truck freight increase if such is favored at the association's current convention in Louisville, Ky.



CURRENT REFINERY OPERATIONS

Districts	Per Cent Capacity Reporting	Daily Average Crude to Stills (Barrels) Week Ended		Per Cent of Reporting Capacity Operated Week Ended		Stocks: Thousands of Barrels — Total Finished and Unfinished Motor Fuel*		Stocks: Thousands of Barrels — Total Finished and Unfinished Gas & Fuel Oil		Cracked Gasoline Production: % Total Capacity Reporting	Cracked Gasoline Production: Daily Av. Production (Barrels) Week Ended	
		Nov. 6	Oct. 30	Nov. 6	Oct. 30	Nov. 6	Oct. 30	Nov. 6	Oct. 30		Nov. 3	Oct. 30
East Coast	100.0	543,000	533,000	81.2	79.7	17,750	18,260	15,078	15,145	100.0	124,000	122,000
Appalachian	88.4	106,000	102,000	82.2	79.1	2,606	2,616	980	956	94.6	31,000	20,000
Ind., Ill., Ky.	92.4	450,000	461,000	92.0	94.3	9,948	10,009	7,492	7,488	98.5	143,000	151,000
Okla., Kans., Mo.	84.7	276,000	265,000	72.1	69.2	6,005	6,146	3,930	3,952	90.3	77,000	73,000
Inland Texas	56.6	140,000	122,000	69.7	60.7	2,056	1,947	1,899	1,900	71.7	39,000	34,000
Texas Gulf	95.7	734,000	734,000	92.1	92.1	8,661	8,282	11,496	11,347	98.0	170,000	169,000
La. Gulf	96.6	148,000	154,000	88.1	91.7	2,007	2,062	3,572	3,644	100.0	25,000	29,000
No. La., Ark.	63.7	47,000	50,000	81.0	86.2	355	406	468	469	77.5	8,000	7,000
Rocky Mt.	69.7	50,000	46,000	80.6	74.2	1,334	1,315	622	638	85.4	16,000	16,000
California	90.9	524,000	538,000	70.2	72.1	12,683	12,588	72,225	72,136	98.0	74,000	70,000
Total Reporting	89.0	3,018,000	3,005,000	81.5	81.2	63,105	63,631	117,762	117,675	94.3	707,000	691,000
Estimated U. S. Total (Bur. of Mines Basis)		3,335,000	3,325,000			67,035	67,271	121,012	120,925		780,000	765,000

*Includes stocks at refineries, in bulk terminals, pipe lines and in transit.

Lewin Answers Defense Counsel On Motions To Dismiss Charges

(*Continued from page* 31)
certed action or agreement of the defendant companies to buy gasoline in East Texas," the attorney declared. "The evidence shows a concerted selling program," he said, and added it was the same sort of an organization as was upheld in the Appalachian case.

Purchases Varied

Wood read figures showing that purchases by companies through the East Texas association were high one month, low the next, and that some months some companies took no gasoline. This fact, he said contradicted the government's contention that the companies got together and set the ratio of he gasoline each was to take each month. "It negatives any inference there was concerted buying", he asserted.

There was no evidence put in the record that the companies ever communicated in any way to set the price they would pay for this East Texas gasoline, and, he concluded, the companies charged with participating in the East Texas program should be dismissed from the case, regardless of the other defendants.

When Wood had finished his argument, the defense indicated no other arguments would be made on the general contentions referring to dismissal of all defendants, as outlined Monday by Donovan.

Government Replies

Government Counsel Lewin then started the government's answer to the three arguments presented on behalf of the motions to dismiss.

Lewin took up defense counsel's contentions one by one, reading from the record either testimony or documents which he said proved the government's case.

He read documents mentioning "allocations" in connection with the East Texas program, and purporting to refer to the "buying program in East Texas," and read from a list of telephone calls made by Buckley, during 1935, to major company buyers.

Characterizing Wood's argument as "extravagant statements," Lewin said that these documents and telephone calls were evidence that the program in East Texas was a "buying," and not a "selling" program.

Lewin said it appeared defense counsel felt that unless the witnesses called by the government "repeated the indictment in the selfsame words" then the government has not proven its case.

Then Lewin said "I am always suspicious" when counsel make such statements as "not one scintilla," or "not one iota" of evidence, and indicated that he was also suspicious that some of the law cited by defense pleaders was not applicable to the case.

Eight Stair Steps

Lewin then pointed to the chart showing the "eight steps" which the price of gasoline in the Mid-Continent took early in 1935, and said that defense counsel Dorr's argument that the Connally act affected this refuted Donovan's contention that there was no connection between the East Texas and Mid-Continent programs.

Here Lewin referred to the steps on the chart as "the golden stairs to greed and avarice," mapped out by that committee (the so-called tank car stabilization committee).

There is no analogy between this East Texas program and the Appalachian case, Lewin argued — for in the East Texas program "buyers and sellers were banded together."

Several clashes between counsel marked the Lewin argument. On three or four occasions Donovan asked Lewin what page of the record he was reading from, or the number of the exhibit he was referring to. Several times Lewin said he'd tell Donovan later, and once when Donovan asked him, Lewin came back with:

"Evidently the defense counsel is not content with heckling me when I'm examining a witness, but must break in on this, too."

Donovan apologized: "I'm not trying to peck at you. I'm awfully sorry, but I'd like to follow you."

As to the Mid-Continent program, Lewin told about Jacobi's testimony in which he said he recommended eight price changes, all increases, and said they were reflected on the chart.

Then he produced a letter written by Jacobi on March 15, 1935, and said "he hadn't been before the grand jury then, and hadn't been in conversation with Col. Donovan's office."

"I resent that aspersion, your Honor," Donovan said, rising again. After some argument between counsel, Judge Stone said "both sides have a right to consult with the witness in a criminal case."

Lewin sought to discount the testimony of several witnesses called by the government, among them, John Steiger, Tulsa market checker for *Platt's Oilgram*, whose testimony in court, he said, was different from that before the grand jury. Lewin charged that Steiger got major purchases along with jobber purchases from independent refiners, and "published them."

Lewin read some of Steiger's testimony in court, during which Steiger had testified that he "tried to distinguish" between major and jobber purchases from independent refiners; said "we asked for jobber prices", and that "we have checked back and found that some of these independents sold to majors."

Then Lewin said "If he found it in some instances, the powerful inference is that there were many instances of such." The government attorney said Steiger's testimony at the trial had differed from his grand jury testimony, and added "and now, these defendants say our entire case breaks down because he didn't know, or couldn't remember."

At this point Lewin asked the court:

"What weight do you give his flat statement, after this testimony, that he didn't print major purchases?"

Lewin said the evidence showed that Buckley was drawing pay from Cities Service all the time he was said to be helping the East Texas Refiners Association, and again read from letters which he said connected the defendant companies up with the East Texas program as a "buying program" rather than a "selling program".

He said that evidence showed that something like 50 cars a year went to purchasers other than major companies through the East Texas Refiners Marketers Association.

Lewin had not completed his argument when court adjourned until 9:00 A. M. Wednesday, November 17. Other government counsel are scheduled to answer arguments on the motions to dismiss later.

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Researchers Looking for 125 Octane Number Fuels

By ARCH L. FOSTER, Technical Editor

"It would appear that the trend of aircraft fuels is bound to be in the direction of a progressive steady increase of octane number."

This statement, by S. D. Heron before the refining technologists at Chicago last week, sums up in a nutshell the prospects and the problems of refining chemists and engineers in light fuels for the next decade or for an indefinite period, the ultimate of which no one can foresee. It was fifteen years ago when fuel specialists first began to concern themselves with the quality of fuels which affect "knocking" in an engine. Midgeley and Boyd were the Drakes of the fuel technology field, first blazing a trail which has been followed to such signal purpose by an increasing number of scientists since their early efforts. Tetraethyl lead came into use, and with it a new era in fuel utilization.

The "in-sight" limits of this progressive advance are only mentioned by Gustav Egloff in a statement made also this week; aviation fuels of 125 to 150 octane number are seen in the offing. Fuels of 100 octane number are already being manufactured and used by the million gallons. Egloff says that a billion gallons, of the nine billion gallons of polymer fuel which can now be produced in the United States, can be converted to iso-octane fuels of 90 to 100 octane number. By blending with, say, an equal amount of suitably volatile light material of about the same octane rating, and the use of small amounts of lead, fuels of 100-110 octane number to the amount of two billion gallons or nearly 25 million barrels can be produced.

Yet this base material, iso-octane, which was formerly a $20 per gallon product and now made for little more than that number of cents per gallon, is by no means the last word in octane rating for such fuels. Other iso-paraffins or products made therefrom, can be used either to augment the total available supply of high octane rating fuels or to yield such fuels of still higher ratings for even more special purposes.

The importance of these new super-fuels is made clearer by another of Heron's statements. He stated that the use of 70-octane number fuels in most modern multi-engine transport aircraft would preclude the carrying of *any* payload. In other words, the maximum power producible with such fuels as the average automobile fuel of today would be barely enough to lift these tremendous planes off the ground and force them through the air.

In comparison with 87 octane number fuel, Heron shows that for an 8-hour flight the consumer, equipped with engines which can extract the last vestige of advantage from 100 octane number fuels, will realize a premium of 6.9 cents per octane number over 87 octane number fuels. Other estimates place the incremental value of 100 octane number fuel as high as 25.5 cents per gallon when the plane is fully loaded.

All these figures are based on the premise that planes and engines are designed to utilize all the potential value in these fuels. From a practical angle, the present commercial planes must be worn out and replaced by planes suited to the new fuels. Until this is an accomplished fact this country will doubtless have a surplus capacity of iso-octane production, since at present the military services are the only plane users which are converting speedily to the use of 100 octane number fuels. Commercial airlines are experimenting with these fuels and engines. They must, however, consider carefully the overall cost of replacing old planes with new and the cost of the new fuels, a consideration not required of the military services.

But the research engineer is no nearer a breathing spell than he was when he developed 100 octane number fuels. The isolation, the synthesis of fuels of 110, 125 and higher ratings is his problem now, and on which he has already made remarkable advances.

Refining Technology

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100 Octane Number Fuels Increase Power 30 Per Cent R-307

Tremendous savings possible for commercial aircraft using 100 octane number fuels, in terms of earning power compared with planes using 87 octane number fuels.

Aviation and Motor Fuels as Produced by Polymerization R-318

Polymerization and hydrogenation of normal and isobutenes to iso-octane in a commercial plant; 347 barrels of iso-octene are produced from 1300 barrels of butane-butene, and the iso-octene catalytically hydrogenated to iso-octane.

Iso-Octane Yield Doubled by "Hot Acid" Process R-332

The cold-acid process was first developed for making iso-octene, which is hydrogenated to iso-octane. Further development showed doubled yields by using higher temperatures, without appreciable octane number loss.

"State of the Art" as Seen in the World's Current Technical Literature R-340

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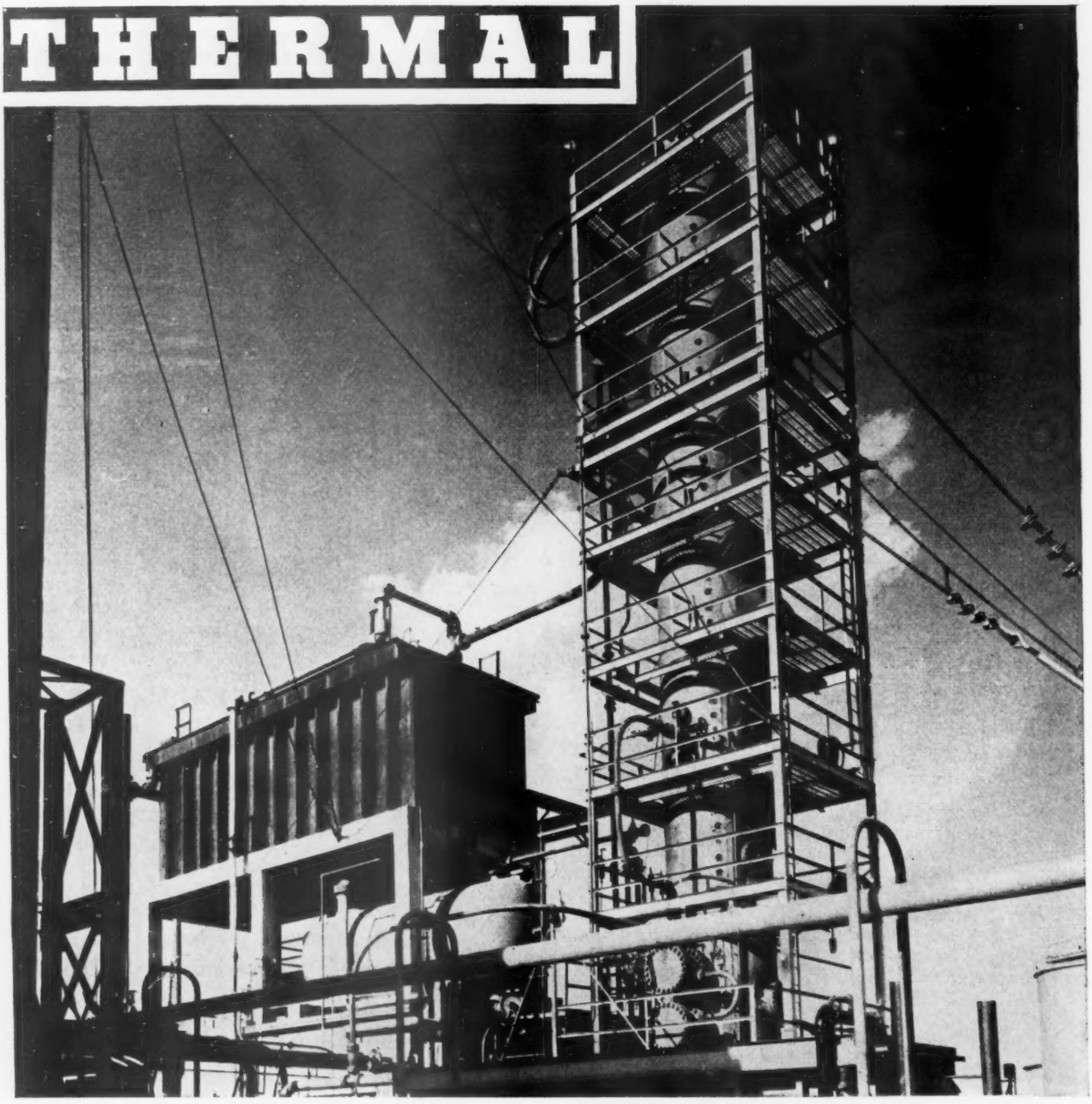

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100 Octane Number Fuels Increase Power 30 Per Cent*

By S. D. HERON**

Commercial Aircraft Earnings Nearly 100% Greater Than With 87 Octane No.

Abstract

● This author's statement, that "The use of 70-octane number fuels in modern multi-engine transport aircraft would preclude the carrying of *any* payload" is the most significant and illuminating comparison made recently by an authority discussing new aircraft fuel developments. (Italics are the editor's).

The author concludes that the trend will be for aviation fuels to go over 100 octane number in the future. Reduction of cruising fuel consumption is hindered by the consequent burning of exhaust valves and other troubles due to cruising with economically lean air-fuel mixtures. Operation with leaner mixtures is stressed, as a necessity for greater fuel economy and the justification of more expensive fuels.

Iso-pentane is frequently used as a blending agent in fuels containing iso-octane, giving higher volatility.

Cost per pound-mile of payload, and not cost per gallon, is the real criterion of operating expense.

THE constant increase in specification requirements of petroleum products for aircraft-engine use has often been a thorn in the flesh of the manufacturing departments of the oil industry. The refiner is at times inclined to regard the demands for products which are increasingly difficult to produce and steadily more costly as unjustifiable whims of the aircraft industry. That the developments of the last 10 years, which have turned commercial aviation from a struggling infant into a fairly mature adult, are due in no small measure to improved petroleum products is not generally appreciated in the refineries. The use of 70-octane fuels in most modern multi-engine transport aircraft would preclude the carrying of any payload.

It would appear that the trend of aircraft fuels is bound to be in the direction of a progressive steady increase of octane number. This will involve the use of synthetic fuels which many refineries cannot manufacture economically at present. Refiners who assume that the present trend of octane numbers is evidence of unsound development methods on the part of the aircraft industry would seem to be due for a rude awakening.

In this paper an attempt will be made to survey: history of fuel and concurrent engine development, effect of octane number on engine performance, relation of engine and aircraft performances, and the relation of engine performance to aircraft earning capacity.

Fuel Development and Its Past Influence on Engine Development

In 1928 fuel of 50 octane number was in general service use, but was found to have destructive effects on the larger air-cooled engines. Attempts to control anti-knock value were ineffective until the octane-number scale was adopted in conjunction with standardized knock-test methods. These knock-test methods gave results which were reliable indices of full-scale engine behavior only in the case of straight-run gasolines, either clear or blended with lead. With the establishment of a workable method of defining fuel anti-knock quality which gives a reasonably accurate index of full-scale engine value, the possibilities of increased engine performance with the higher octane-number bracket soon became generally appreciated. The U. S. Army Air Corps standardized 87-octane fuel (about 84 ASTM octane number) for all uses except training, and 73 and 80 octane numbers soon became standard for commercial use. Fuel of 87 ASTM octane number came into limited commercial use for take-off purposes.

With the introduction of the Douglas DC2 airplane, 87-octane take-off fuel came into general commercial use in conjunction with 80-octane fuel for cruising. In general, engines using 87-octane take-off fuel and 80-octane cruising fuel in commercial service were, and are, so supercharged that the normal cruising power can be maintained up to an altitude of about 12,000 ft., beyond which it begins to fall off. There is now a general demand for the maintenance of normal cruising power to higher altitudes, and engines are now so supercharged that cruising power can be maintained to an altitude of about 15,000 ft., and this has resulted in the use of 87-octane fuel for cruising. The demand for minimum fuel consumption at the cruising condition has also been a contributing factor in the use of 87-octane fuel for cruising. Take off fuel of 90 ASTM octane number is now in limited commercial use.

Fuels up to 87 octane number with 3 cc. lead can be generally produced from selected straight-run naphthas. Fuel of 90 ASTM octane number, with 4 cc. lead, can be produced from straight-run naphtha. When more than 87 octane number is required with a 3-cc. lead limitation, the use of synthetic blending agents then becomes essential.

RESULTS of tests with 100-octane (Army method) fuels by the U. S. Army Air Corps were given early in 1935 by Klein.[1a] Most of the fuels tested contained commercial *iso*octane, and the results served to show the possibilities of increased engine performance with fuel octane numbers in excess of the then current 87 ASTM. However, 100-octane fuel has as yet had only very slight commercial use, although it appears inevitable that it will come into such service on account of the demands for maximum take-off power and minimum specific fuel consumption at cruising. The aircraft-users' demands for take-off power and cruising economy apparently can only be met with 100-octane fuel even with the most advanced of available engines.

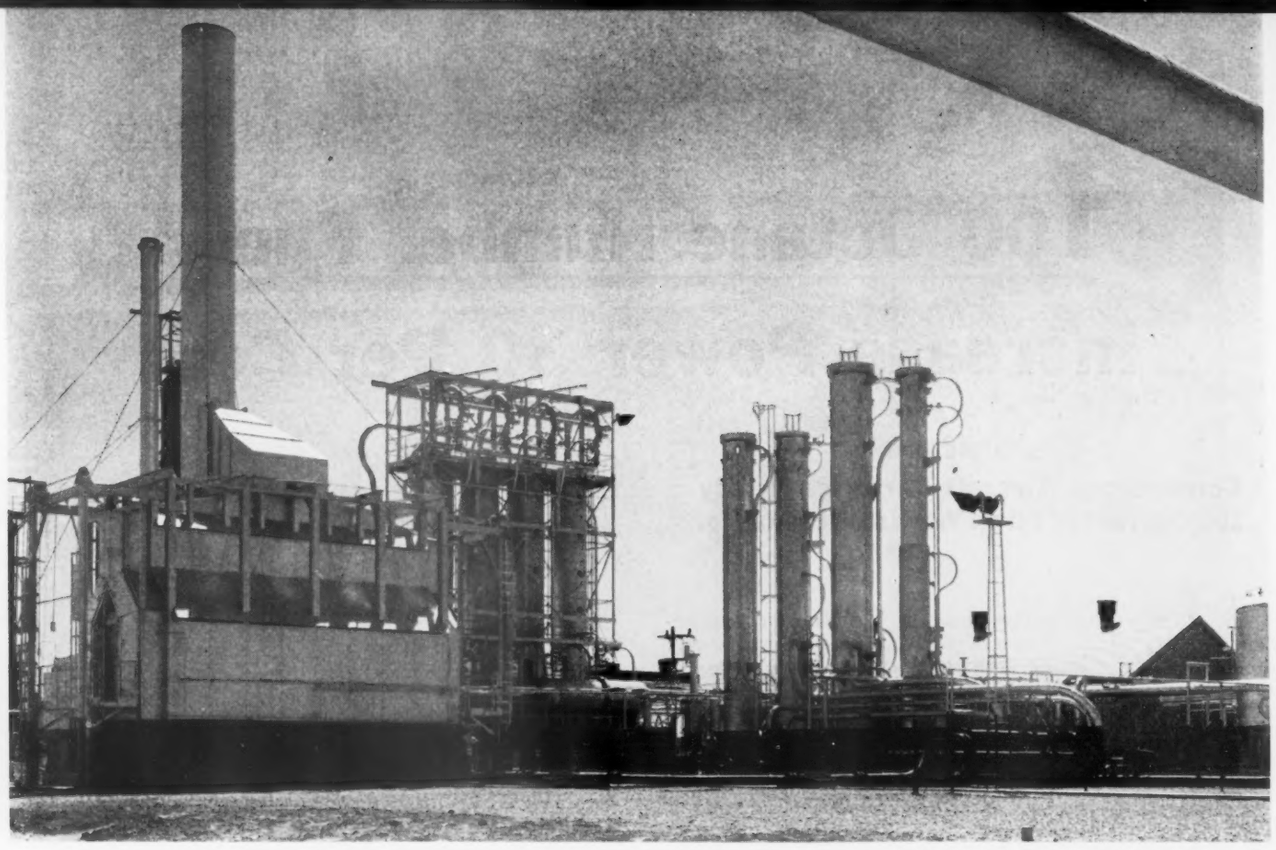
Special aircraft engine fuels, usually containing alcohols and high percentages of aromatics and producing abnormally-high performance for racing and other stunt purposes, have been used in the past; but, apart from cost and limited supply, such fuels have had limitations which made them considerably inferior to normal 87-octane fuels for general service use.

The advent of 100-octane fuels using *iso*octane, blended with straight-run gasoline as a base, resulted in a high-octane fuel which was free of the operating disadvantages of the stunt type of fuel. Fuel blends of 100 octane number, containing *iso*octane, can be used with the same operating technique that is observed with current fuels using gasoline alone as a base. With *iso*octane-gasoline blends the

*Presented before American Petroleum Institute, Chicago, Ill., Nov. 12, 1937 under the title, "Aircraft Operation with Fuels of 100 Octane Number and Higher."

**Ethyl Gasoline Corp., Detroit, Mich.

a Figures refer to bibliography on p. R-316.



A U.O.P. pyrolytic butane cracking and catalytic polymerizing unit, operating on butane-propane from natural gas to produce polymer gasoline of about 80 octane number and 4.7 lbs. Reid vapor pressure. About a 40% yield by volume is obtained from the original butane-propane charge

problems of storage, contact with water, fuel-tank capacity, fuel-system and carburetor freezing, and carburetor settings are essentially the same as those involved with the use of gasoline.

Blending agents other than *iso*octane are available for the production of fuel blends of 100 octane number or more. *Iso*octane, however, is the only blending agent with any considerable background of service use, and the following discussion of high-octane fuels is confined to blends made with *iso*octane as the major base blending agent. Limitation of discussion to *iso*octane blends does not infer that other blending agents have not a present wide field of application or may not have wide use in the future. While the discussion is limited to *iso*octane blends, it should be noted that such blends generally contain *iso*pentane, which gives the finished blend volatility characteristics similar to the present types of aviation gasolines.

AT LEAST half of the improvement in aircraft-engine performance in the last 10 years is due to increase of fuel octane number[2] and to the use of the octane-number scale in conjunction with methods of measuring octane number, which result in any given grade of fuel giving substantially-uniform service performance in any given engine type. High-octane fuels would be of little value if the effective full-scale engine octane number was subject to considerable variation from batch to batch.

Aircraft engines can be designed for satisfactory operation on 50-octane fuel. The Curtiss D-12 water-cooled 12-cylinder engine and many 200-hp. air-cooled training engines have given very satisfactory results on fuel of 50 to 55 octane number. It is probable that aircraft engines can be produced which will develop 50 per cent more mean effective pressure on 50-octane fuel than do present automobile engines on 70 octane number. There is no question, however, that such engines are not, and would not be, acceptable for high-performance aircraft use as long as the present type using high-octane fuels is an available alternative.

Aircraft is only able to compete with other forms of transportation by virtue of its performance. Point-to-point speed and ability to reach high altitude are the major items of aircraft performance by means of which it successfully competes with other forms of transport. From the military standpoint 60-m.p.h. airplanes might have a limited field if they could reach any given altitude more rapidly than a balloon, but such a speed entirely eliminates the airplane from true commercial use.

It has been argued that the aircraft industry is obtaining increased output and performance by the use of higher octane numbers rather than pursuing the apparently sounder course of obtaining high output and performance with fuels of about 70 octane number; 1,500 hp. per engine is now available with 100-octane fuel, and it would take at least two years to develop an engine to give the same output on 70-octane fuel, even if all restrictions as to size and weight were removed.

WHILE engine development may result eventually in obtaining the same over-all performance on 70-octane fuel as is now obtained with 100-octane fuel, such a result is at best problematical, and the aircraft industry wisely took advantage of a proven improvement rather than spend largely in time and effort attempting to secure a probable but uncertain result.

The aircraft-engine industry is continually striving for the production of increasingly-powerful engines, as witnessed by the introduction of 1,400-1,500-hp. engines this year in this country. However, the production of more power by the mere increase of cylinder capacity sometimes results in increased engine power without increase of aircraft performance. In addition, large increase in engine-cylinder capacity, as a means of obtaining increased power, may result in a much greater increase of over-all cost of development than the use of higher-octane fuels, since the engine industry is not always on sure ground when jumping from an existing engine type to one with 30 per cent greater cylinder capacity.

The Effects of Octane Number on Engine Performance

The more important effects of octane number on engine performance will be surveyed in the following discussion. The wide difference in engine and fuel conditions at take-off and cruising operation is not usually understood by those outside the aircraft field. It is often assumed that the best specific fuel consumption the engine will give is

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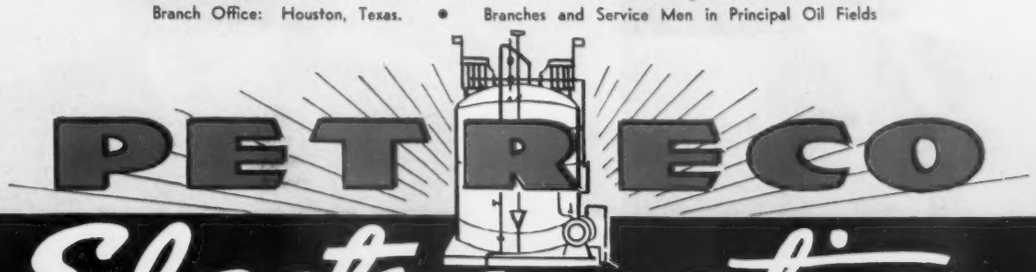

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obtained at its maximum possible mean effective pressure. Thus, a mean effective pressure of 200 lb. per sq. in. is often associated with a specific fuel consumption of 0.40 lb. Both of these are possible in some engines, but not simultaneously.

Relation of Take-off to Cruising Conditions

Since at the take-off condition the maximum possible power is required, all available methods of increase are resorted to. Detonation or other forms of uncontrolled combustion are most likely to occur in the range of air-fuel ratios between that giving maximum power and that giving complete combustion. It has been found that high fuel consumption will, within limits, make possible the same power output as is available with a higher-octane fuel running leaner. Thus, Klein[3] reports sensibly similar output and cylinder temperature on 92- and 100-octane fuels, with the latter having a 19-per-cent lower specific consumption. Rich mixture in lieu of high octane number has its limits, however, since excessive loss of power occurs if carried too far. For take-off at present, mixtures somewhat richer than those giving maximum power are general. Specific fuel consumption at take-off is quite generally as high as 0.7 lb. per B.H.P.H.,* but this is unimportant since the total quantity of fuel used in the take-off and initial portion of the climb is quite small in comparison with the total fuel load.

The cruising power is generally of the order of 60 per cent of the take-off power, the mean effective pressure being about 75 per cent of that at take-off. Since at the cruising condition, both mean effective pressure and mixture temperature are lower than at take-off, the stress on the fuel is much reduced, and air-fuel ratio can be considerably increased. In present practice, cruising consumptions in flight of less than 0.45 lb. per B.H.P.H. are reported.

Power

Klein[1] in the first published performance data on comparison of 100-octane (Army method) fuel vs. 92-octane (Army method—approximately 87 ASTM) fuel showed that the permissible increase of power was 12 to 30 per cent, depending on engine type and operating conditions.

DuBois and Cronstedt,[4] using a supercharged full-scale single-cylinder engine, found that technical *iso*octane permitted 17 per cent more power output than 92-octane fuel (Army method—approximately 87 octane number, ASTM).

Current model engines in the 1,000-1,500-h.p. class have 15 to 20 per cent higher take-off ratings with 100-octane fuel than with 87-octane.

DuBois and Cronstedt[4] have shown that *iso*octane plus 3 cc. of lead will allow an output increase of more than 17 per cent over that available on *iso*octane alone. Klein[3] has shown that *iso*octane plus 3 cc. lead will give 55 per cent more power than *iso*octane alone. Studies in a supercharged engine in the laboratories of the Ethyl Gasoline Corporation have shown that fuels of over 100 octane number may give more than 160 per cent of the power available on pure *iso*octane, or 250 per cent or more of that available on 70-octane fuel.

Fuel Economy

Young[5] has shown that a specific fuel consumption of 0.35 lb. per B.H.P.H. can be obtained on the dynamometer with a large air-cooled engine operated at essentially cruising conditions on 100-octane fuel. This engine had a compression ratio of 7.85 to 1 in order to obtain the maximum fuel economy with 100-octane fuel. A similar engine, with a 6.4 to 1 compression ratio and using 92-octane (Army method) fuel, gives a best fuel economy of about 0.42 lb. per B.H.P.H. The engines with 7.85 to 1 and 6.4 to 1 compression ratios have about the same available take-off powers on the fuels they are designed for, viz., 100 and 87 octane number.

Klein[3] has reported comparisons of 100- and 92-octane (Army method) fuels using the same type of engine as that discussed by Young.[5] Klein's engine had a compression ratio of 6.45 to 1; but, owing to differences in operating conditions and possibly owing to slight design modifications, gave much higher cylinder temperatures than shown by Young's data for the same compression ratio, at essentially similar output and revolutions per minute. At an output of 565 to 570 hp., Klein's data indicate that the minimum specific fuel consumptions just avoiding detonation are approximately 0.55 and 0.68 lb., respectively, for 100- and 92-octane fuels. Thus the difference in fuel consumption at fixed compression ratio and output is approximately 19 per

*Brake horsepower hour.

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cent lower for 100-octane than for 92-octane fuel. Young, by varying compression ratio to secure maximum economy at about the same power as Klein, with 92- and 100-octane fuels obtained a reduction in consumption of about 17 per cent for the 100-octane fuel.

In general, the reduction of consumption that may be expected as a result of the use of 100-octane fuel in place of 87-octane (ASTM) is at present the subject of considerable discussion, with various estimates being used for the purpose of calculation. As Young has pointed out, it is not now possible to cruise engines in flight at the minimum consumptions obtainable on the dynamometer. However, with accurate measurement of both fuel flow and power[2] in flight now possible, cruising consumption in the air may be expected to become increasingly closer to the optimum dynamometer possibilities. It is the author's opinion that 100-octane engines, suitably installed and operated, may be expected to give between 10 and 15 per cent lower consumption than equally efficient equipment designed for 87-octane (ASTM) fuel. Thus, if 0.44 lb. per B.H.P.H. is being achieved with 87-octane fuel, 0.38 to 0.40 lb. may be expected with 100-octane fuel. If existing 87-octane equipment is being operated under too severe cruising conditions, the substitution of 100-octane fuel without equipment change may well be expected to render possible a fuel consumption reduction of more than 10 to 15 per cent.

That leaning off the air-fuel mixture is, in general, more important in securing reduction of fuel consumption in aircraft engines than is compression ratio is not usually appreciated outside the aircraft-engine field. In the past in the aircraft-engine field, and at present in other engine fields, reduction of consumption by leaning off the mixture has been avoided on account of exhaust-valve burning and other troubles. Browne[6] was the first to emphasize the relative effects of mixture strength and compression ratio on fuel economy, and his remarks were startling to many engineers not familiar with aircraft-engine practice.

Mead[2] has stated that cruising at extremely low fuel consumption is the most critical condition that modern engines have to meet. Until demand for minimum cruising consumption became pronounced, the take-off condition was much the more critical than cruising.

Thus, the gains in engine performance due to 100-octane fuel in place of 87-octane fuel may be summarized as: a power increase of up to 30 per cent, reduction of cruising fuel consumption of 10 to 15 per cent, and the probable attainment of cruising fuel economy closely comparable with that of a compression-ignition engine.

The Effects of Octane-Number Increase On Aircraft Performance

Experience is now sufficiently extensive that the engine effects of octane-number increase can be foretold within limits. From the change of engine performance, the effect on aircraft performance can be fairly definitely predicted. The effect of octane-number increase on earning power of commercial aircraft is much more indefinite than the change in aircraft performance. Several mathematical surveys of the economic value of 100-octane fuel vs. 87-octane fuel have been made, and arrive at widely different answers.

Some rather elementary discussion of the effects of engine performance of modern aircraft operation is thought to be justified at this stage.

Speed

The direct effect of power on speed at any given altitude is slight. Thus, a 10-per-cent increase in power at the best produces only a 3-per-cent speed increase, and usually considerably less than 3 per cent. While the direct effect of power on speed at any given altitude is slight, the effects of maintaining power to increasing altitude has had very large effects on speed. If engine power is held constant, irrespective of altitude, the airplane speed increases with altitude due to reduction of resistance as the air density falls off. Thus, when density has been reduced to 70 per cent (approximately 10,000 ft.) of that at sea level, airplane speed will have increased by about 20 per cent. The modern clean airplane, equipped with flaps and controllable pitch propellers and having high wing loading, achieves with relatively-low engine power remarkable cruising speed at altitudes of 10,000 to 15,000 ft. In general, as the altitude to which a given power must be maintained is increased, so are the octane-number requirements raised. The reduction of air density with increase of height is counteracted by more supercharging. This usually involves higher mixture temperature and greater indicated power, both of which increase the stress on the fuel.

Take-off

With current land-plane types, the critical condition of power requirement is at take-off—since it is necessary to secure sufficient ground speed for the ship to become airborne and to have a sufficient rate of climb to be able to gain altitude sufficient to clear obstacles at the boundaries of modern major airports. Barnard,[7] in a recent survey, has shown that modern land-transport airplanes have an average take-off weight of 13 lb. per take-off horsepower.

The high speed of modern aircraft is to a very considerable extent the result of the large increase in take-off power produced by recent engine, propeller, and fuel improvement and, particularly, to the constant-speed propeller which enables the engine to develop its full take-off power throughout the take-off run and the initial portion of the climb. The great increase in effective available take-off power in recent years has resulted in high-speed designs of aircraft which could not have taken off with the older-engine and propeller equipment.

Increased take-off power may find its greatest value in reducing the length of the take-off run and distance traveled before an obstacle of given height can be cleared. One large aircraft operator has calculated that, in the case of large multi-engine transports, a 20-per-cent increase in take-off power will reduce by 45 per cent the distance necessary to take off and reach a height of 50 ft. On these figures it is indicated that, if a change from 87- to 100-octane fuel produces a 20-per-cent gain in take-off power, a ship using 100-octane fuel can obtain the same standard of safety in take-off from a 180-acre airport as given by 87-octane fuel from a 600-acre airport (both airports rectangular and geometrically similar). The problem of take-off has become sufficiently critical to warrant consideration being given to either a considerable increase in airport size of the use of catapulting.[8,9] The area and cost of airports usually increase sensibly as the square of the length of the take-off runway, and airport costs are already very high. Hence, it would appear that engine or fuel developments which result in rendering available increased power for the short period necessary for take-off are likely to have very considerable economic value. Catapulting of land airplanes will, of course, involve considerable expense, and further limits operation to and from airports equipped with catapults.

Catapulting of seaplanes is already in use in experimental Transatlantic air service. It would seem obvious that the investment in and operating cost of catapult mother ships must be so high that take-off fuels costing as much as $50 a gallon would be economically justified if they rendered possible an unassisted take-off.

In seaplanes and flying boats, the take-off condition is somewhat less critical than in land transport—since the allowable take-off distance is not, as a rule, affected by obstacles surrounding the take-off course. No matter what the length of run available, however, take-off time or distance is limited by the fact that the engine over-heating will occur if the take-off run at low air speed is extended beyond certain time limits peculiar to each installation. In flying boats, increase of take-off power would appear to be essential in many cases of very long-distance non-stop operation, where crew, fuel, oil, and equipment loads now represent 90 per cent or more of the disposable load.

Fuel Consumption and Range

Increase of fuel octane number may be used to increase airplane range by three methods:

1. The first is to increase the available take-off horsepower by more supercharging at take-off, thus allowing a greater fuel load to be carried. In this case reduction of specific fuel consumption at cruising may or may not be obtained, depending on the severity of the engine operating conditions.

2. In the second case the engine compression ratio is increased to give minimum possible fuel consumption avail-

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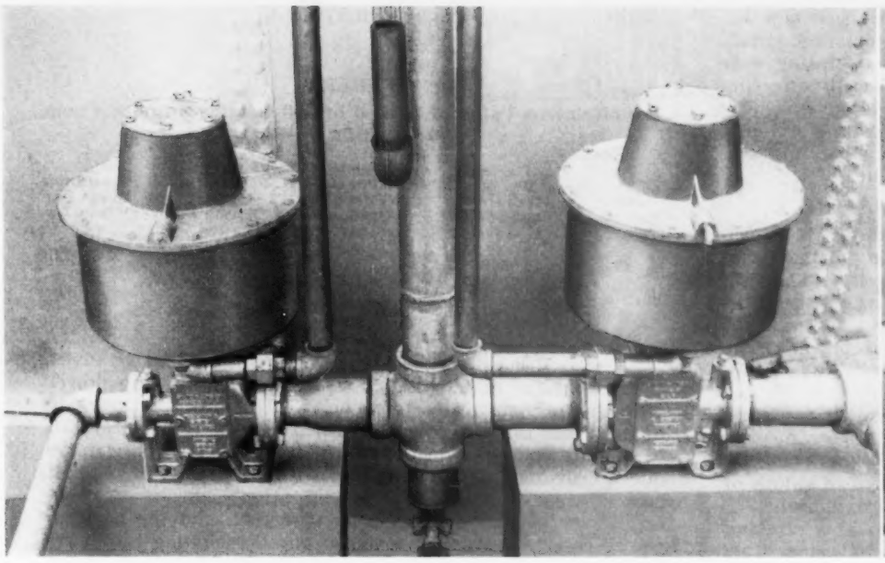

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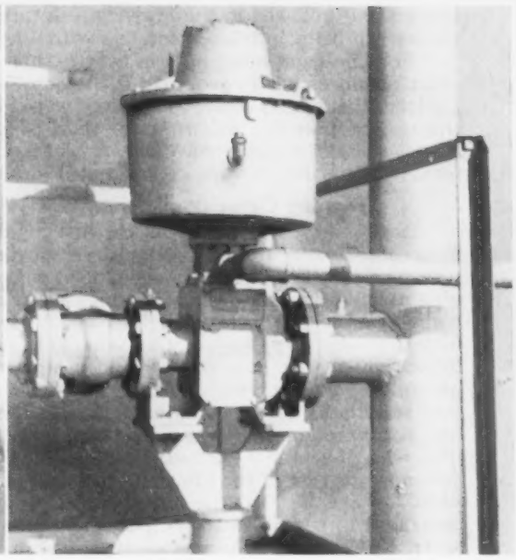

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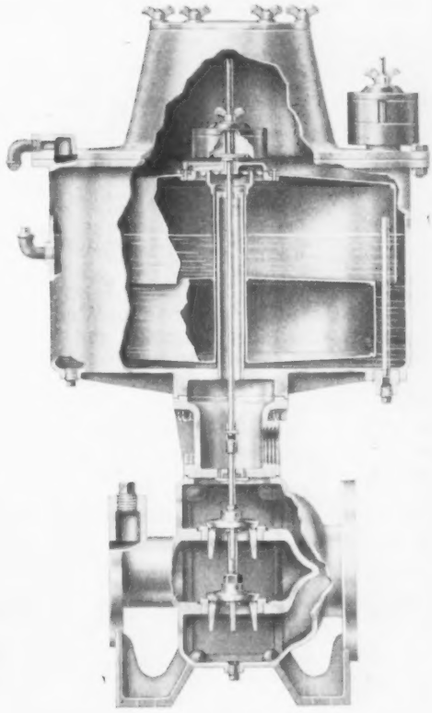

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able with the fuel to be used at the required cruising power. In this case the compression ratio is likely to be increased to the point where take-off power is no greater than that obtained with the formerly-used lower-octane fuel and engines with lower compression ratio.

3. The third method involves increase of compression ratio and take-off power, the compression ratio being increased sufficiently to have a noticeable effect on cruising fuel consumption and yet permitting a considerable increase in take-off power.

It is the author's opinion that the third method is most likely to be followed in the immediate future when new airplanes are being produced for use with 100-octane engines.

In some equipment now in service, and operating over short distances where fuel load is not significantly affecting payload, there is no doubt that safety would be increased by the use of take-off fuel of more than 87 octane number. However, this would involve the use of a double fuel system, which is not always considered desirable.

Earning Capacity of Commercial Aircraft

Bass[10] has made mathematical investigations of the effects of 87- and 100-octane fuels on earning capacity of transport airplanes at 100-per-cent load capacity. The first type of investigation deals with the case of an existing airplane fitted with 87-octane engines which are to be replaced with 100-octane engines of the same take-off power. The 100-octane engines have their cylinder capacity reduced (apparently by 20 per cent) and their specific weight is 9½ per cent less than the 87-octane engines. The cruising specific fuel consumption is 9½ per cent less with 100-octane fuel than with 87-octane. With assumptions of 25 cents per U. S. gallon as the cost of the 87-octane fuel and payload values of $0.000385 and $0.00077 per pound-mile (approximately 7½ cents and 15 cents per 200-lb. passenger-mile) at a cruising speed of 160 m.p.h., the premium values of 100-octane fuel found are as shown in Table 1 for various flight ranges.

TABLE 1

Bass' Calculations of Earning Capacity of 100 Octane Number Fuel

Range Hours	Payload Revenue (Dollars Per Pound-Mile)	Premium—Per Cent Cost of 87 Octane No.	Premium—Dollars Per U. S. Gallon Over 87 Octane No.	Premium—Cents Per Octane No.
0	$0.000385	63	$0.16	1.2
0	0.00077	121	.30	2.3
4	0.000385	122	.31	2.4
4	0.00077	240	.60	4.6
8	0.000385	182	.46	3.5
8	0.00077	360	.90	6.9
16	0.000385	300	.75	5.8
16	0.00077	600	1.50	11.5
20	0.000385	360	.90	6.9
20	0.00077	716	1.79	13 8

If Bass' data are re-calculated—substituting payload revenues, 87-octane fuel costs, and fuel gravities which approximate the average in this country—the premium values become as shown in Table 2. In calculating Table 2, 87-octane fuel costing 15 cents per U. S. gallon, payload values of $0.00025 and $0.0005 per pound-mile (5 cents and 10 cents per 200-lb. passenger-mile), and fuel gravities of 70 API for both 87- and 100-octane fuels have been assumed. The 20-hour-range condition dealt with by Bass closely resembles a 2,300-mile non-stop transoceanic flight with 40 per cent reserve fuel.

TABLE 2

Bass' Data Re-calculated, Using Average Values of the Three Variables

Range Hours	Payload Revenue (Dollars Per Pound-Mile)	Premium—Per Cent Cost of 87 Octane No.	Premium—Dollars Per U. S. Gallon Over 87 Octane No.	Premium—Cents Per Octane No.
0	$0.00025	71	$0.11	0.8
0	0.0005	133	.20	1.5
4	0.00025	134	.20	1.6
4	0.0005	259	.39	3.0
8	0.00025	197	.30	2.3
8	0.0005	385	.58	4.4
16	0.00025	323	.49	3.7
16	0.0005	635	.96	7.4
20	0.00025	386	.58	4.5
20	0 0005	760	1.14	8.8

Bass also considers the case of the relative carrying power of an 87-octane airplane and a 100-octane airplane, both with engines which are similar in cylinder capacity and other respects, except output and cruising consumption. For the 100-octane engine the take-off power is increased 20 per cent, the specific cruising fuel consumption reduced by 9½ per cent at 20-per-cent increased cruising power. The specific weight of the 100-octane engine is assumed to be decreased by 9½ per cent—the actual weight, therefore, being about 9½ per cent more than the 87-octane engine. With other assumptions as to fuel cost, fuel gravities, etc., similar to those used in Table 1, Bass concludes that the premium values of 100-octane fuel for various flight ranges are as shown in Table 3.

TABLE 3

Bass-Relative Value of 87 and of 100 Octane Number Fuels, in Carrying Power

Range Hours	Payload Revenue (Dollars Per Pound-Mile)	Premium—Per Cent Cost of 87 Octane No.	Premium—Dollars Per U. S. Gallon Over 87 Octane No.	Premium—Cents Per Octane No.
0	$0,000385	710	$1.78	13.7
4	0.000385	650	1.63	12.5
8	0.000385	595	1.48	11.4
16	0.000385	478	1.19	9.2
20	0.000385	420	1.05	8.1

Barnard[7] has made an extremely comprehensive investigation of the effects of octane number on earning power with the aircraft loaded to capacity. The effects on payload of increased take-off power obtained by raising boost and of increasing compression ratio, the latter reflected only in reduced cruising fuel consumption without change of take-off power, are examined. The investigation is based on earning power per pound (or gallon) of fuel, and the earning power resulting from any octane-number change is not related to any particular basic cost for, say, 73- or 87-octane fuel. The basic equation used credits increased take-off power with either a larger and heavier airplane or, conversely, only a fraction of the increased load taken off is considered as disposable load. Calculated data showing the effects of specific payload revenue (dollars per pound-mile) and a range of disposable loads (disposable load equals crew plus oil and fuel plus revenue load) per available take-off horsepower are included. Among the most important of Barnard's findings are the following:

1. That the change of earning capacity per octane number varies from about 2¼ cents to 8 cents per gallon, depending on operating conditions.

2. Earning capacity per octane number is proportional to specific payload revenue.

3. Range has only a slight effect on the earning capacity per octane number.

4. That increase of compression ratio to obtain minimum cruising fuel consumption and increased take-off power obtained by added supercharging, without affecting cruising fuel consumption, have sensibly equal effects on the incremental earning power per octane-number increase.

5. "The indicated increases in earning power are so much greater than any probable fuel-cost increases that the upward trend of octane-number requirements and use is clearly evident."

Keith, Carey, and Ward[11] have examined the earning capacities of 87- and 100-octane fuels in existing aircraft on a 720-mile non-stop flight. The relative earning capacities of the two fuels are considered on a basis of cruising specific fuel consumption. The airplane has a maximum permissible take-off weight, and reduction of fuel consumption enables more payload to be carried. The 87-octane engines are assumed to be replaced with 100-octane engines, and the latter are assumed to give a 15-per-cent reduction in specific cruising fuel consumption, and take-off and cruising powers are assumed to be the same for both engine types. The decreased fuel consumption with 100-octane fuel is considered in terms of its value from zero to 100 per cent load factor, i.e., from no passenger, mail, or express load to maximum allowable take-off weight. Various distributions of load factor, such as half the flights with no payload and half with capacity payload, are examined.

Keith, Carey, and Ward make the point that increased

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earning power based on capacity payload can never be fully realized in practice. On the above bases it is calculated that the payload may be increased by 11 per cent by the use of 100-octane fuel, and that as long as the payload does not exceed 90 per cent capacity (on 100-octane fuel) the earning power of the 100-octane fuel is only 2.1 cents per gallon more than that of the 87-octane fuel. As the payload increases beyond 90 per cent, the incremental value of 100-octane fuel becomes greater—reaching 25.5 cents per gallon with the airplane fully loaded. If only 10 per cent of the flights are made with capacity load, the incremental value of 100-octane fuel becomes 4.5 cents per gallon.

The opinion is expressed that due to fixed charges, etc., of the potential increased payload revenue, only 25 per cent can be credited to the fuel. This together with the savings in total fuel consumption, gives a net premium earned by 100-octane fuel of 2.1 cents per gallon for no full-capacity loads, 2.7 cents when 10 per cent of the flights carry full-capacity load, and 7.9 cents when all loads are full-capacity.

When Bass' data in Table 2 are compared with those of Barnard, they are at least of the same order of magnitude, i.e., roughly 2 to 8 cents per gallon increased earning capacity per octane-number increase. Keith, Carey, and Ward show a value for increased earning power of 2 cents per gallon per octane number at 100 per cent load factor. Bass' and Barnard's computations are both on a basis of 100 per cent load factor, and their figures for the minimum incremental earning power per octane number are in agreement with Keith, Carey, and Ward's maximum. The minimum value per octane number computed by the latter authors is 0.16 cents per gallon per octane number. It is this author's opinion that Bass is somewhat optimistic in crediting 100-octane fuel with both a 20-per-cent increase in specific take-off engine output and a 9½-per-cent reduction in specific cruising consumption. It is granted, however, that with some engines, under suitably-chosen operating conditions, increase of octane number from 87 to 100 can be expected to increase power by more than 20 per cent and decrease cruising consumption by more than 9½ per cent.

THE data of Keith, Carey, and Ward on all up-weight, disposable load, fuel consumption, etc., for the transport used in their calculation may be used for a flight of double the length they assume. Using their figures for ratio of fuel consumptions on 100- and 87-octane fuels and for warm-up and take-off fuel weight—doubling the cruising and reserve-fuel supply and increasing the oil load by 50 per cent—the payload becomes about 1,100 lb. for 87-octane fuel and about 2,000 lb. for 100-octane fuel. At 5.75 cents per 200-lb. passenger-mile (assumed by Keith, Carey, and Ward) the increased earning capacity of the 100-octane fuel becomes approximately 48 cents per gallon, or 3.7 cents per octane number, at 100 load factor. This last figure for earning capacity serves to emphasize the importance of fuel consumption in long-range operation.

Summarizing the findings of Bass, Barnard, and of Keith, Carey, and Ward, the increased earning power of 100-octane fuel over 87-octane fuel varies from 2 cents to $1.79 per gallon. In each of the three investigations the increase of earning power depends on a number of variables such as proportion of flights made with capacity payload, flight range in non-stop hours, and specific payload revenue. The highest premium value of $1.79 per gallon is obtained by Bass, with a specific payload revenue value of approximately 15 cents per 200-lb. passenger-mile on a 20-hour non-stop flight.

If Keith, Carey, and Ward's final estimate of 3 to 6 cents per gallon increased net earning power for 100-octane fuel over 87-octane fuel is taken in conjunction with their estimate of only 7 to 9 cents per gallon manufacturing cost of *iso*octane, it would appear certain that there is an immediate field for 100-octane fuel in existing commercial aircraft.

In the military field, the advantages of increased power, improved cruising fuel consumption, or both together, are so pronounced that cost is entirely secondary as long as potential supplies are adequate. Potential supplies of blending agents for the manufacture of 100-octane fuels [12-13] appear to be in excess of any likely demand. In the military field the demand for performance is so intense that all possible means of improvement are taken advantage of, and none can be safely neglected. Thus with advance of engine development, a continual demand for further fuel improvement can be expected.

Fuel Gravity and Heat Content

Fuels of 100 octane number consisting of *iso*octane and gasoline are generally uniform in gravity and heat content per unit volume. This is of importance, since modern engines are generally equipped with automatic carburetors which control the fuel supply required by the various conditions of operation by metering substantially on a volume basis. Both the aircraft and petroleum industries must face the fact that such controls cannot be effective with fuels which vary widely in heat content per unit volume. Thus, when using a blend containing 60 per cent or more of aromatics, and which is equally as effective in all respects as one made with gasoline and *iso*octane, the aromatic blend will waste fuel when used with carburetor controls set for an *iso*octane blend. If the carburetor controls are set for the aromatic blend, the engine will be dangerously lean on the *iso*octene blend. In lieu of development of suitable carburetor controls for controlling fuel supply on a heat-content basis, it is to be expected that any one aircraft operator is likely to demand that his fuel supplies shall be practically uniform in heat content per gallon.

Conclusion

Aircraft operators in general have shown a regrettable tendency to consider fuel costs in terms of price per gallon. Fuel costs are a considerable item in operating cost, and the operators' reluctance to face increased gallonage cost is understandable. Cost per pound-mile of disposable or payload is, however, the real criterion of operating expense, and this may well bear no relation to cost per gallon when considering fuels of different octane numbers.

The wide differences in engine operating conditions at take-off and cruising are not usually familiar to those outside the aircraft industry. Discussion, in rather elementary terms of these phases, as influenced by fuel octane number has, therefore, been included.

It is to be expected that, following the general use of 100-octane fuels, investigation will be concentrated on the improvements available as a result of still higher anti-knock values. *Iso*paraffins of higher anti-knock value than *iso*octane are known. One of these at least appears to be in all respects a desirable aircraft fuel, and to be not impossible of commercial synthesis.

Acknowledgments

The author is much indebted to Dr. Harold A. Beatty for critical and editorial assistance. The assistance of Mr. Val Cronstedt has been invaluable, particularly in the matter of aircraft performance.

* * *

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Aviation and Motor Fuels As Produced by Polymerization†

BY GUSTAV EGLOFF*, J. C. MORRELL*, and E. F. NELSON*

● Butane-butene mixtures are selectively polymerized with about 27% yield, based on the charge, to produce iso-octenes, which are catalytically hydrogenated to yield iso-octane of 90-100 octane number.

Combination butane cracking and polymerization is described, which produces 109 barrels of pyrolytic polymer and 293 barrels of catalytic polymer per day from 1090 barrels of butane.

Three modifications of the catalytic polymerization process are given; (1) Polymerization of propene-butene; (2) Pyrolytic cracking of butane-propane, producing olefins which are catalytically polymerized; (3) Selective polymerization of butenes and hydrogenation of the iso-octenes to iso-octane for high octane number blending material.

THE polymerization process is one of the most important developments in the petroleum refining industry. Motor fuel was first produced by straight distillation, and later by cracking. The quantity of gas produced in the cracking process increases with the improvement of the antiknock quality of the motor fuel product, and a satisfactory economic disposal of this gas was a real problem. This was solved by the introduction of the polymerization process with the production of a superior motor fuel from the gas. The cracking process depends for its economic utility on the conversion of heavier hydrocarbons to lighter ones of greater value, while the polymerization process is in principle the reverse, namely the conversion of gaseous hydrocarbons to liquid ones in the form of high antiknock motor fuel.

Over 9,000,000,000 gallons of polymer gasoline may be produced yearly from the hydrocarbon gases produced in the United States, of which over 1,000,000,000 gallons may be iso-octane fuel of 95 to 100 octane rating. The principal economic goal of the polymerization process was the conversion of these gases used primarily for heating purposes into motor fuel. The objective was not only attained but the product was found to be a super type.

The demands of the automobile and aircraft industries for high octane fuel have been increased from year to year and polymerization in its various modifications and aspects, including selective polymerization for the production of iso-octanes, has met these demands. Since 1925 the maximum automobile speed has increased from 60 to over 100 miles per hour and the cruising speed of airplanes from 80 to 220 miles per hour, and this has been made possible primarily by high octane motor fuels.

The requirements of automobiles may generally be

†Presented before American Petroleum Institute, Chicago, Ill., Nov. 12, 1937, under the title, "Motor Fuels From Polymerization."

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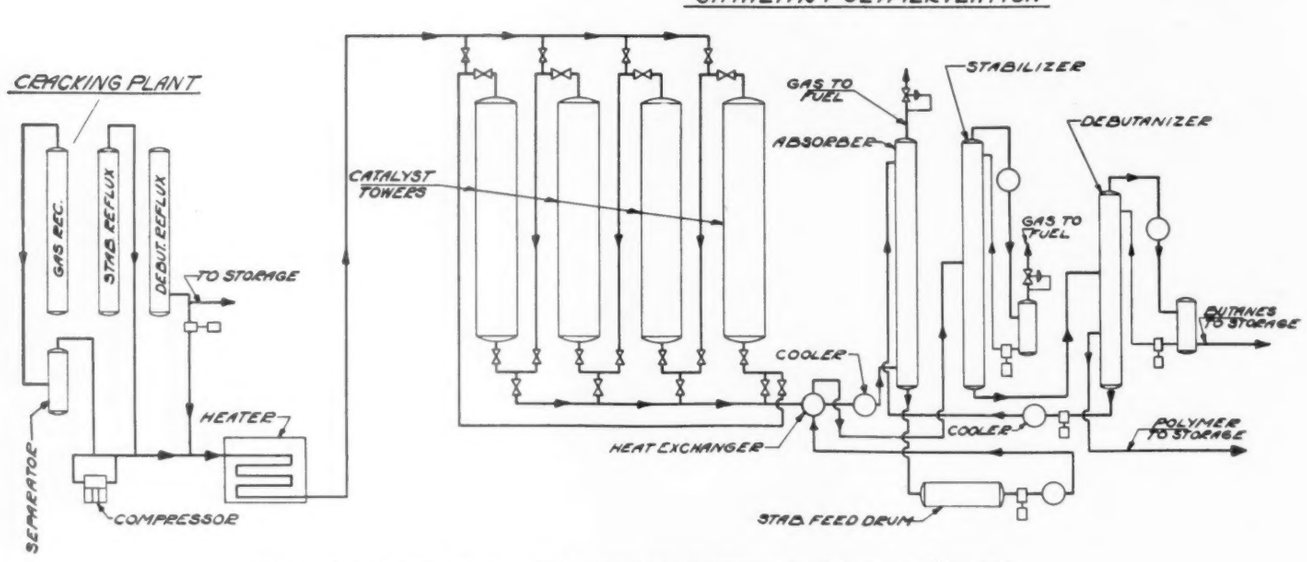

Fig. 1. Typical flowsheet of a unit polymerizing unsaturated gases from a cracking unit

satisfied by fuels of a value less than 75 octane number. For airplanes, however, fuels of 95 to 100 octane number are desirable and for military purposes are necessary. The Army and Navy have practically set a standard of 100 octane number fuel for their own use and will require from 50 to 60 million gallons for the current year. The diplomacy of European and Far-Eastern countries is built up around petroleum, the most important strategic product of which is 100 octane aviation fuel.

The power output and load carrying capacity of a given airplane has been increased. When using a 100 octane number fuel an increase in power of from 20 to 30 per cent over that of an 87 octane fuel was obtained.

Polymerization has pointed the way and is a definite advance in chemical control of the composition and properties of motor fuels. The day has arrived when a motor fuel may be designed and produced commercially as branch chain paraffins such as iso-octanes, or mixtures of iso-octanes, isopentanes, and isohexanes.

For many years it has been the goal of chemists in the petroleum industry to employ petroleum as a raw material for the production of chemical derivatives of petroleum hydrocarbons for use in the various arts and industries. This goal is now a reality because of the development of the cracking process whereby the olefins contained in the gases produced therefrom may be converted into a large number of products including alcohols, glycols, alcohol-ethers, ethers, oxides, aldehydes, ketones, esters, acids, anhydrides, chlorinated compounds, amines, and products useful in the arts as explosives, dyes, medicinals and the like.

The catalytic polymerization process represents one of the most important steps in the production of these chemical derivatives in addition to providing a chemical means for the petroleum technologist to produce motor fuels, such as iso-octanes, having definite composition and properties.

In the present report three modifications of catalytic polymerization will be described. All of them employ the so-called solid phosphoric acid catalyst developed by Dr. V. N. Ipatieff.

One of the simplest means of utilizing the catalytic polymerization process is to treat gases containing propene and butenes. In the first modification to be described in this paper, the charging material consists of hydrocarbon gases containing propene and butenes. In the second modification, known as the selective polymerization process, the olefins contained in the hydrocarbon gases are principally butenes. In the third process to be described, the paraffin hydrocarbons such as butanes are converted by pyrolysis into olefin hydrocarbons which are subsequently converted into motor fuel by catalytic polymerization.

2. Catalytic Polymerization

A catalytic polymerization unit in commercial operation treating 14,000,000 cubic feet of cracked gas a day containing 25.4% of propene and butenes is producing at the daily rate of 68,000 gallons of 82-octane motor fuel of 9-10 lbs. Reid vapor pressure.

The gas to be treated is obtained from the stabilizer and the debutanizer of the cracking unit and may, if desired, include the gas from the receiver.

The typical analysis of the gas leaving the cracking plant receiver is shown in Table 1.

TABLE 1

Typical analysis of cracking plant receiver gases.

	Mol. %
Methane	58.20
Ethylene	6.71
Ethane	13.09
Propylene	6.05
Propane	10.62
Butylene	2.06
Butanes	2.08
Pentanes & Heavier	1.19

The unstabilized gasoline produced in the cracking process is pumped to a stabilizer operated at a pressure of 350 pounds to produce propane-propene-free bottoms. In this operation part of the butane-butene fraction is taken over at times.

An analysis of the gas from the stabilizer is shown in Table 2.

TABLE 2

Analysis of gasoline stabilizer tail gases.

	Mol. %
Methane	11.01
Ethylene	5.98
Ethane	19.10
Propylene	18.38
Propane	35.67
Butylenes	4.89
Butanes	4.97

The gasoline from the stabilizer may go direct to storage or may pass to a debutanizer operated at a pressure of about 100 pounds, wherein the cracked gasoline is stabilized to a low vapor pressure. This vapor pressure is determined by the over-all yearly butane balance of the plant. The butane-butene fraction may go to storage or part to the polymerization unit.

Various proportions of the gases from the cracking unit obtained as described are charged to the polymerization unit at a pressure of approximately 300 pounds. The combined charge to the polymerization unit is heated to a temperature of 375-400°F. and is passed through the catalyst towers in series flow. The towers are packed with the solid granular phosphoric acid catalyst which has a definite size and shape.

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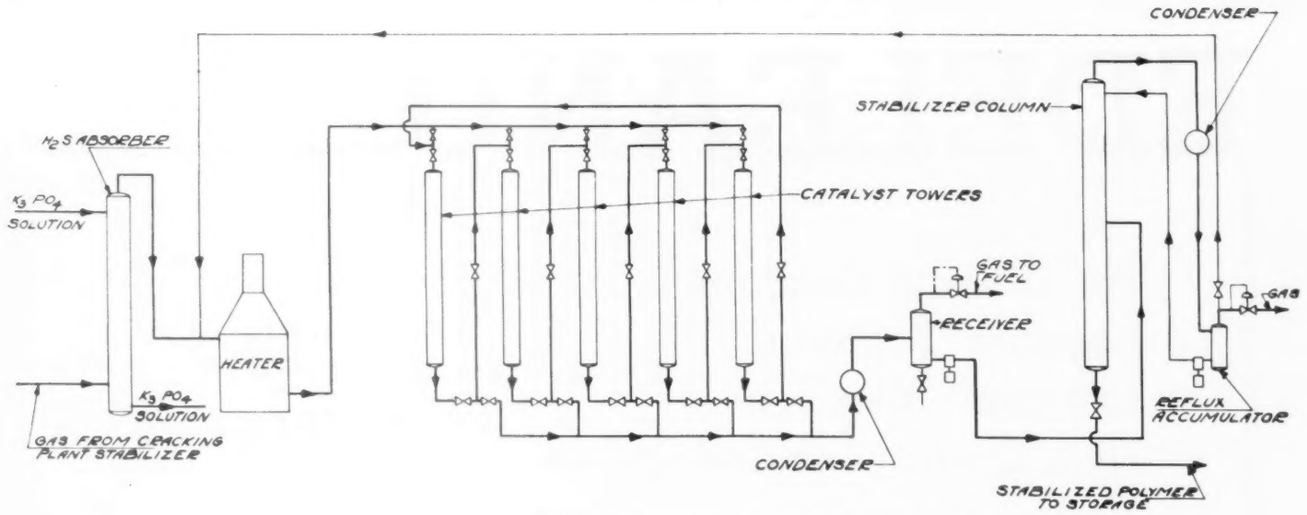


Fig. 2. Unit for removing sulfur from charge gases, and polymerizing the nearly sulfur-free product from a cracking unit

When passing through the catalyst towers, the gases increase in temperature about 150°F. due to the exothermic polymerization reaction. The rise in temperature varies with the percentage of higher olefins in the gas being processed.

Analyses of hydrocarbon gases charged to the catalytic polymerization unit at various times during the operation are shown in Table 3.

TABLE 3

Analysis of gas charged to catalytic polymerization unit.

	(1) Mol. %	(2) Mol. %	(3) Mol. %
Methane	13.9	24.1	32.3
Ethane and Ethylene	21.7	24.6	23.3
Propene	15.4	12.8	12.8
Propane	32.5	25.0	20.2
Butenes	8.5	6.2	5.4
Butanes	8.0	7.3	6.0

A typical flow sheet of this process is shown in Fig. 1. The mixed gases are passed through a heater wherein they are raised to the reaction temperature and are then passed under the operating pressure of the polymerization process through the catalyst towers. The towers are arranged so that they may be operated in sequence and so that any one may be cut out for regeneration.

The polymer product together with residual gas passes through heat exchangers and coolers into an absorption column operated at a pressure of 225 pounds employing the low vapor pressure fraction of the polymer as an absorption oil. The liquid product from the absorber passes to a stabilizer feed drum and the residual gas goes to the fuel system. The liquid in the stabilizer feed drum is heat exchanged with the products leaving the catalyst tower and is then fed into the stabilizer, the gases from which are passed to the fuel system or may be recirculated back to the catalyst towers. The overhead from the stabilizer contains propane-propene and lighter gases. The liquid product from the stabilizer flows to the debutanizer operating at 100 pounds pressure wherein the C_4 fraction containing about 13% butenes are removed and sent to storage. The polymer product is removed as a side cut from the debutanizer and sent to storage and the low vapor pressure polymer from the bottom of this column is recirculated as absorption oil.

As the run progresses, the order in which the catalyst towers are used is changed. During the operation the catalyst becomes covered with a carbonaceous deposit which reduces its catalytic activity and which must be removed periodically. The tower containing the catalyst which has become inactive is cut out of the system and the catalyst regenerated by controlled oxidation. After burning, a steam

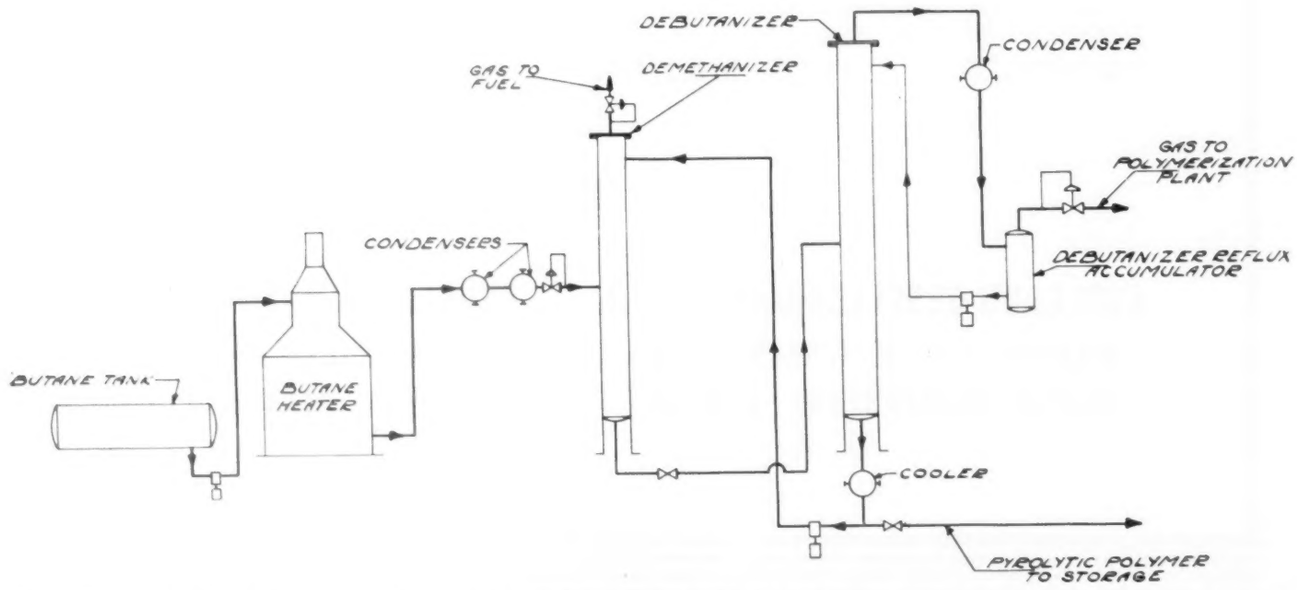
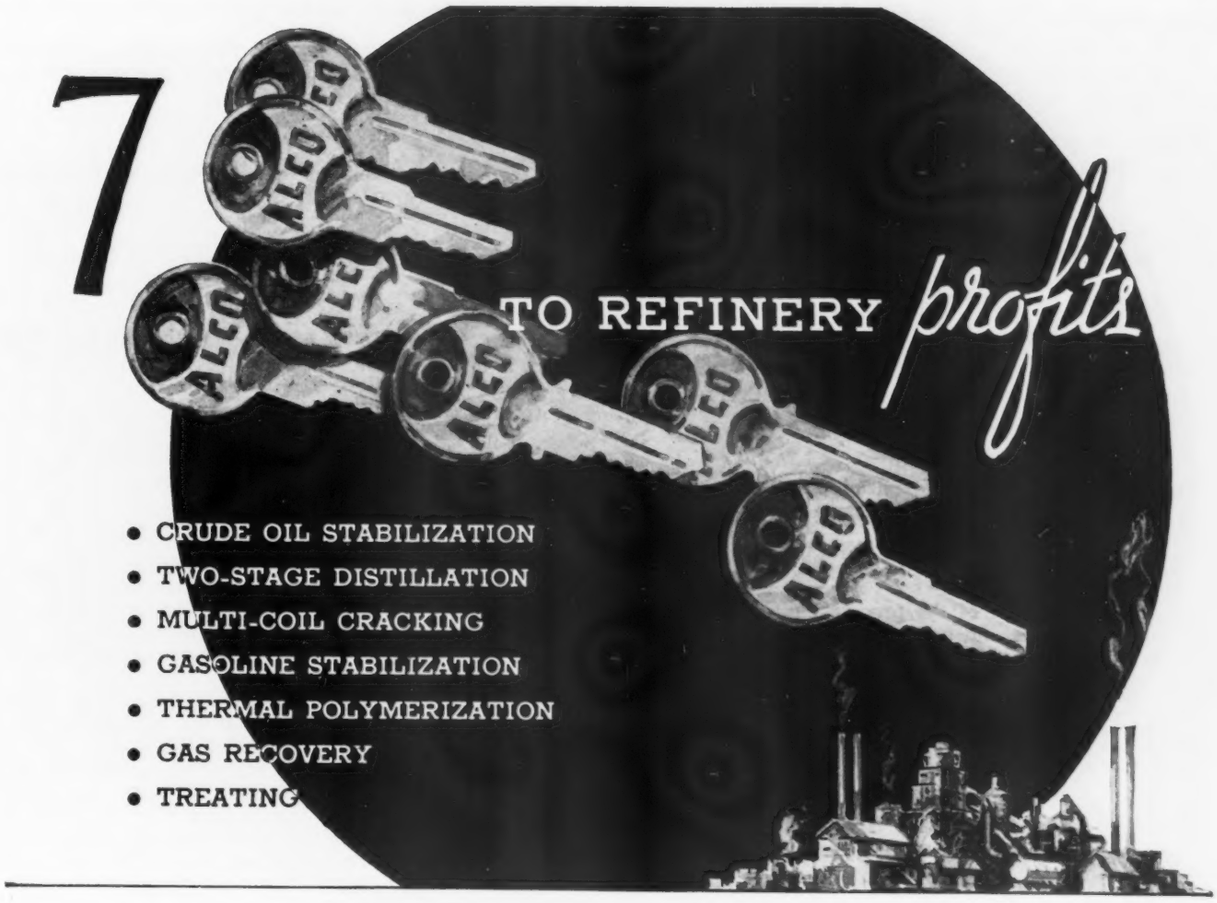


Fig. 3. Flowsheet of a unit cracking butane at about 750 pounds pressure and 1065-1075° F., producing pyrolytic polymer gasoline and butenes for catalytic polymerization



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treatment is used to rehydrate the catalyst which otherwise would be inactive. The catalyst in each tower is reactivated after being in service about sixty days.

From the operation to date, a total polymer production equivalent to about 50 gallons per pound of catalyst has been obtained without any apparent appreciable change in the activity of the catalyst.

Typical analyses of the gas leaving the absorption column at various times during the operation is shown in Table 4.

TABLE 4

Analysis of gases leaving absorption column.

	(1) Mol. %	(2) Mol. %	(3) Mol. %
C_1	33.2	42.6	55.6
C_2	42.3	33.6	28.5
C_3	22.9	22.2	15.1
C_4	1.6	1.6	0.8
% Propene and Butenes	3.3	5.0	2.8

An analysis of the stabilizer gas (depropanizer) to the fuel system is shown in Table 5.

TABLE 5

Analysis of gas from depropanizer to fuel system.

	Mol. %
Methane	4.4
Ethane and Ethylene	27.4
Propene	7.0
Propane	61.0
C_4+	0.2

The polymer product of the process has a Reid vapor pressure of 2-3 pounds and other properties shown in the analysis in Table 6.

TABLE 6

Inspection of polymer product.

Gravity—°A. P. I.	62.2
I. B. P.—°F.	162
10%	189
20	197
50	226
80	290
90	332
E. P.	435
% Rec.	98.5
% Res.	1.0
% Loss	0.5
Reid Vapor Pressure—lbs.	2.7
Octane Number	82.0

The polymer may be sweetened and blended directly with gasoline or may be redistilled if a water white product is desired.

When the product is redistilled, doctor sweetened, and blended with butanes to desired vapor pressure, the analysis is as shown in Table 7.

TABLE 7

Inspection of blend of refined polymers with butane.

Gravity—°A. P. I.	67.1
I. B. P.—°F.	95
10%	156
20	186
30	200
40	212
50	221
60	233
70	250
80	280
90	329
E. P.	376
% Rec.	95.5
% Residue	0.5
% Loss	4.0
Reid Vapor Pressure, lbs.	10.8
Color	30
Doctor	O.K.
Corrosion	O.K.
Induction Period (minutes)	135
Copper Dish Gum	6
Sulfur, %	0.199
Octane Number	82.0

A typical daily operating summary showing quantities charged, and yields of products is shown in Tables 8 and 9. Table 8 shows the results of catalytic processing of cracked gas containing 19.2 per cent propene-butenes and Table 9 shows the treatment of 25.4 per cent propene-butenes containing gas.

In another commercial installation shown in Fig. 2, the gas for polymerization is taken from the cracked gasoline stabilizer at a pressure of about 190 lbs. and a temperature of 135°F. The gas from the stabilizer contains from 35% to 40% of propene and butenes. The hydrogen sulphide content is relatively high and contains from 2% to 2.5% hydrogen sulphide. If the gas containing hydrogen sulphide is passed through the catalytic polymerization unit, the gasoline formed would contain about 2% sulphur mostly of the mercaptan type which would be formed during the reaction. Doctor sweetening the polymer gasoline would be somewhat

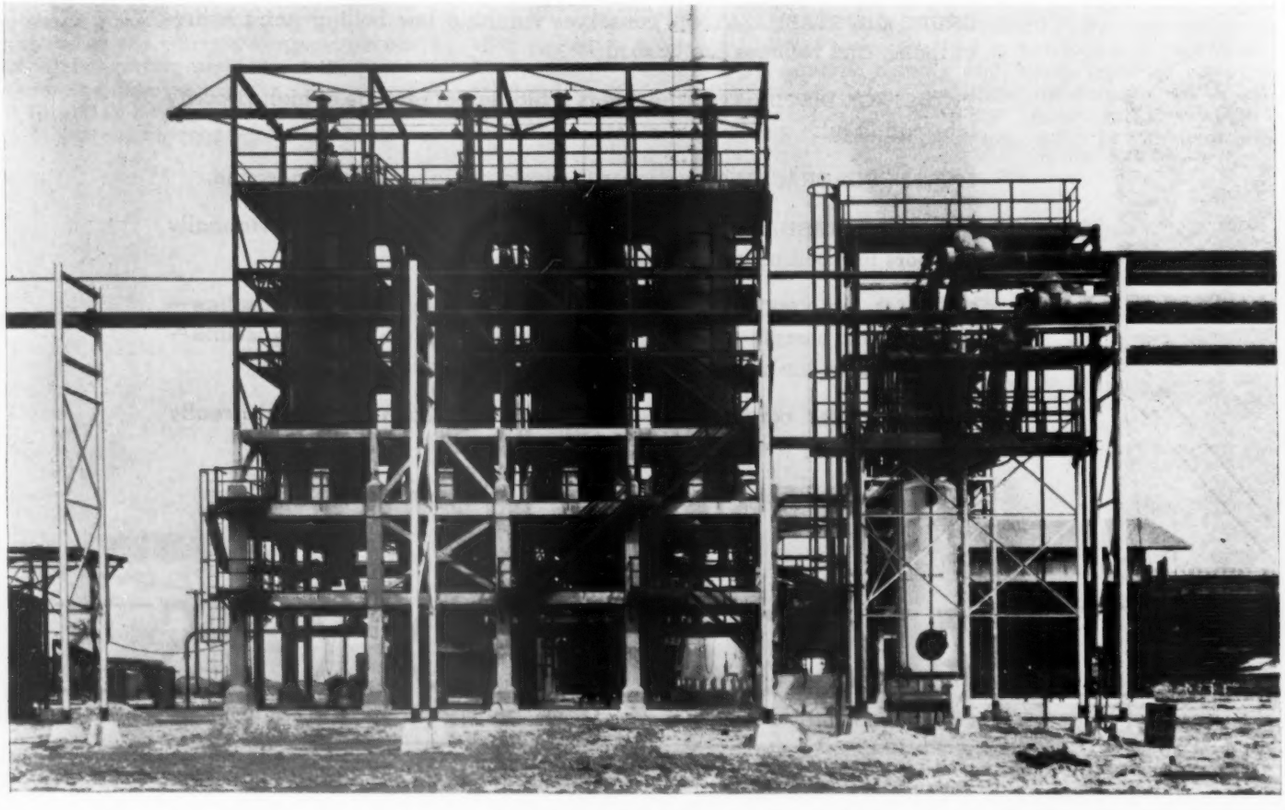

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TABLE 8

Typical daily summary, polymerizer unit.

	M. Cu. Ft.		Propene-Butenes %
Total Feed to Plant	13,070		19.2
Gases from Plant			
Absorber Gas	6,700		
Stabilizer Gas	2,900		
Butanes to Storage	1,350		
Total Gas from Plant	10,950		4.3
% Propene-Butenes Polymerized		79.5	
Liquid Yield from Plant		**Bbls.**	
Butanes to Storage		914	
Butanes to Blend		60	
Total Butanes		974	
True Polymer (2-3 lb. Reid V. P.)		1,082	
Rerun Polymer		1,073	
Rerun Bottoms		9	
True Polymer—Gals./M. Cu. Ft. Total Feed			3.48

TABLE 9

	M. Cu. Ft.		Propene-Butenes %
Total Feed to Plant	13,874		25.4
Gases from Plant			
Absorber Gas	5,062		
Stabilizer Gas	4,032		
Butanes	1,624		
Total Gas from Plant	10,718		4.6
% Propene-Butenes Polymerized		86.5	
Liquid Yield from Plant		**Bbls**	
Butanes to Storage		1,064	
Butanes to Blend		88	
Total Butanes		1,152	
True Polymer (2-3 Lbs. Reid V. P.)		1,474	
Rerun Polymer		1,464	
Rerun Bottoms		10	
True Polymer—Gals./M. Cu. Ft. Total Feed			4.47

difficult and there would be a loss in octane number during the sweetening operation.

The removal of hydrogen sulphide is accomplished by passing the gas which is available at about 190 lbs. pressure and 135°F. temperature, through an absorber column. The absorber column is operated at a pressure of 180 lbs and temperature of about 145°F. Under these conditions no condensation of the heavy hydrocarbons in the gas will take place.

The gas enters the bottom of the absorber and tri-potassium phosphate solution is pumped into the top of the column. The tri-potassium phosphate solution is regenerated and circulated. The gas leaving the top of the absorber has a hydrogen sulphide content of the order of 0.10%.

The polymerization unit was designed to process 2,500,000 cubic feet of gas per day. At the present time there is about 1,500,000 cubic feet per day of gas available in this refinery for polymerization which contains about 40% higher olefins.

For the best operation of the polymerization unit, gas from the polymer stabilizer is recycled through the catalyst towers along with the fresh feed so there is a charge of about 2,500,000 cubic feet per day through the poly unit. The propene-butene content of the combined charge to the polymer plant is about 29%.

The combined feed passes through the gas heater and enters the first tower at a temperature of about 400° F. and passes through the catalyst towers in series flow. The polymer and residual gas pass through the condenser and into the unstabilized polymer receiver. The pressure is held on the entire system by the pressure control valve on the gas release from the polymer receiver. This gas passes to the fuel system.

The polymer gasoline is then stabilized to the desired vapor pressure. The stabilizer is operated at a sufficiently high pressure so that a controlled quantity of the stabilizer gas can be charged back to the fresh feed as recycle without compressing. The net make of gas from the stabilizer is discharged to the fuel system.

The amounts of gas charged and yields of products are shown in Table 10.

TABLE 10

Gas charged, and polymer yield

	M. Cu. Ft./Day		Propene-Butenes %
Fresh Feed to Plant	1,483		37.9
Poly Stab. Gas	901		15.0
Combined Charge to Plant	2,384		28.9
Gases from Plant			
Poly Receiver Gas	753		3.4
Stabilizer Reflux Accumulator Gas	231		15.0
Total Gases from Plant	984		6.1
% Propene-Butenes Polymerized		89	
Total Polymer Produced—Bbls.		250.5	
Polymer Produced, Gals./M. Cub. Ft. Total Feed		7.1	

The analysis of the polymer gasoline follows in Table 11.

TABLE 11

Analysis of Polymer Product

Gravity—°A. P. I.	68.3
Reid Vapor Pressure—Lbs.	9.8
Octane Number	82.2
Mercaptan Sulfur	0.025
Cu. Dish Gum, Mg./100 cc.	5
I. B. P.—°F.	87
10%	132
50	209
90	325
E. P.	403
Rec. %	96.5
Residue %	0.5
Loss %	3.0

A combination gas cracking and catalytic polymerization unit for the conversion of butanes and polymerization of the olefins produced is in commercial operation processing 1090 barrels a day of butane. The butane cracking at high temperature and pressure produces relatively large yields of olefin-containing gases and relatively small amounts of pyrolytic gasoline. The cracked gases are polymerized catalytically as already described.

Referring to Fig. 3 and Photo 2, butanes from the charge tank are pumped through a heater which operates at a pressure of about 750 lbs. and a transfer temperature of 1065-1075° F. Sufficient soaking time is provided in the

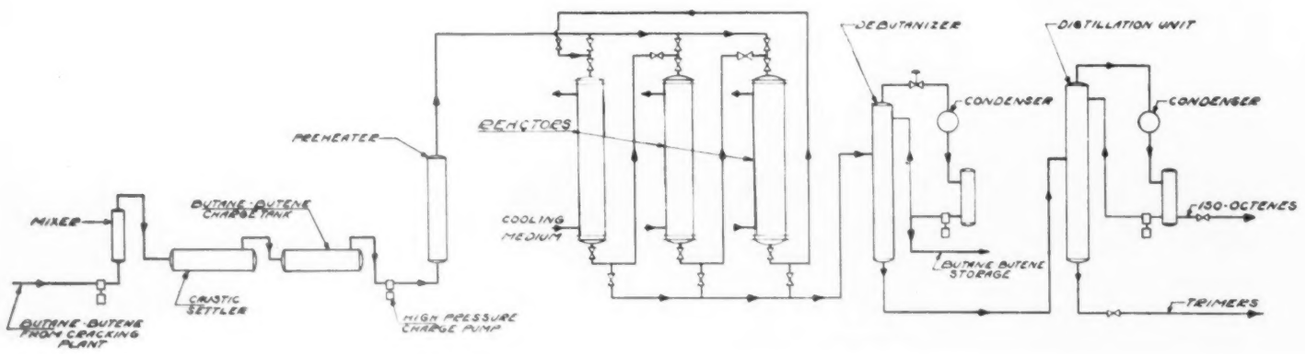
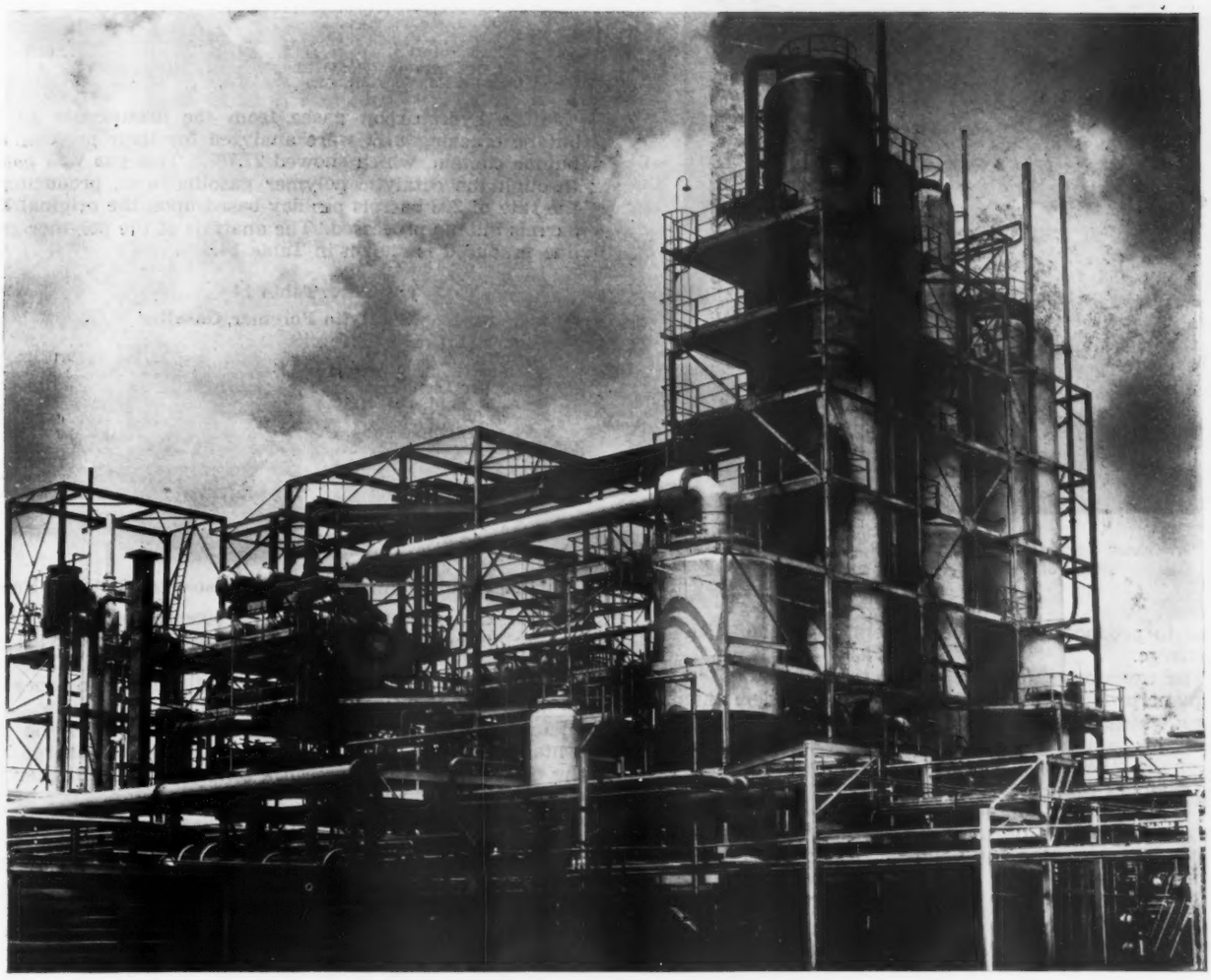


Fig. 4. Flowchart of process producing iso-octenes for hydrogenation to iso-octane

Economic Balance



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Dr. Gustav Egloff, speaker on the A.P.I. program Nov. 11, is author of 276 articles relating to petroleum

heater to produce the desired conversion of about 50% of the charge.

The transfer material is cooled to about 90° F. under full plant pressure and is released into the demethanizer column which operates at 300 lbs. pressure.

In this column substantially all of the methane and part of the ethane and ethylene are removed overhead and the remaining components are removed as bottom product. This separation is accomplished by using debutanized pyrolytic polymer as absorption oil in the top of the column and partially stripping the liquid in the bottom of the column through reboiling.

The bottom product from the demethanizer is discharged into the debutanizer column. This colunm is operated at sufficiently high pressure so that the overhead gases may be satisfactorily processed in a catalytic polymerization plant. These overhead gases which include all of the butane-butenes and lighter hydrocarbons produced during the cracking reaction with the exception of those discarded from the demethanizer column contain from 25% to 28% of propene-butenes.

A debutanized pyrolytic polymer is removed from the bottom of the column. Part is recirculated to the demethanizer column as absorption oil and the remainder passes to storage.

The polymerization unit is of the same type already described. It is followed by conventional fractionation equipment for the separation of catalytic polymer of the desired vapor pressure, and residual butane.

It has been found advantageous to remove hydrogen sulphide from the butane before charging to the unit since this results in the production of doctor sweet products.

In a typical operation the butane fraction from the natural gasoline plant used as charging stock for the cracking-catalytic polymerization unit, showed the analysis in Table 12.

Table 12
Analysis of typical butane "poly" charge

	Mol. %
Propane	3.3
n-Butane	83.2
i-Butane	12.2
Pentane	1.3

This charging stock at the rate of 1090 barrels per day was heated to a temperature of 1065° F. and 750 pounds pressure in the cracking unit, from which 109 barrels per day of pyrolytic polymer gasoline of 4.7 lbs. Reid vapor pressure was produced, having additional properties shown in Table 13.

Table 13
Pyrolytic Polymer Gasoline

A. P. I. Gravity	48.5
A. S. T. M. Distillation	
Sulfur, %	0.22
B. P. °F.	119
% Distilled Over	°F.
10	147
20	159
50	202
90	407
End Point	520
Vapor Pressure (Reid) Lbs.	4.7
Octane No. C. F. R. M.)	74

The hydrocarbon gases from the debutanizer of the butane cracking unit were analyzed for their propene and butene content, which showed 27.7%. This gas was passed through the catalytic polymer gasoline unit, producing at the rate of 293 barrels per day based upon the original 1090 barrels butane processed. The analysis of the polymer gasoline produced is shown in Table 14.

Table 14
Catalytic Polymer Gasoline

A. P. I. Gravity	67.9
Sulfur %	0.01
Gum (A. S. T. M.) Mgs.	12.3
Copper Dish, Mgs.	81
A. S. T. M. Distillation	
B. P. °F.	95
% Distilled	°F
10	134
20	157
50	209
90	333
End Point	430
Vapor Pressure (Reid) Lbs.	8.3
Octane No. (C. F. R. M.)	81

4. Selective Polymerization and Iso-octane Motor Fuel

The catalytic production of iso-octenes from the normal and isobutene present in cracked gases is being carried out commercially under relatively mild conditions. The iso-octenes produced are hydrogenated into iso-octanes of values ranging from 90 to about 100 octane number. The octane ratings can be controlled as a function of the percentage of normal and isobutene present in the charge and the time, temperature, pressure conditions. The higher the octane rating, the lower the yield of iso-octanes per barrel of butane-butene processed.

The process of producing iso-octanes by the catalytic polymerization reaction uses as a charging stock the butane-butene (B.B.) fraction from the stabilizer producing the vapor pressure cracked gasoline desired. The B.B. fraction contains 15% of isobutene, 30% of normal butene and

Dr. J. C. Morrell collaborated in the accompanying paper. His contributions to scientific literature include 150 articles

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GASOLINE ANTIOXIDANTS

55% of normal and isobutanes. A flow chart of the iso-octane process is shown in Fig. 4.

The butane-butene charge is passed through a caustic soda scrubber to remove the sulphur components present. The liquefied hydrocarbon gas is then pumped through a heating coil wherein the temperature is raised to about 350° F. under a pressure of about 600 pounds. The B.B. fraction then passes through a "solid phosphoric acid" catalyst wherein the exothermic heat of the reaction is controlled by a cooling fluid, such as oil around the reaction tubes, and the desired temperature is maintained during the polymerization. Dependent upon the time-temperature-pressure conditions prevailing and the percentage of normal to iso-butane present in the charge, their combination takes place in varying proportions.

The polymer product is then passed to a tower where it is stabilized, after which it is fractionated into the iso-octenes (dimers) and dodecenes (trimers). In general, the percentage of iso-octenes in the polymer product is about 85%, the balance being trimers. The polymer product produced is 30% of the butanes-butenes fraction charged to the unit. This is when producing iso-octenes (85 octane number) on the basis of a charge of 1:1 ratio of normal to isobutene. The iso-octene fraction which boils between 200° F. and 260° F. is hydrogenated to iso-octanes of 96 octane rating. The commercial unit described has a daily capacity of 1,300 barrels of butane-butene fraction producing therefrom 347 barrels of iso-octenes and 43 barrels of trimers. The iso-octenes are converted into iso-octanes by catalytic hydrogenation.

5. Blending of Iso-octanes.

The iso-octanes being produced commercially have a boiling range from 200-260° F. and therefore are not a complete motor fuel as to volatility. They require blending with hydrocarbons such as those of aviation gasoline boiling range or isopentane, or isohexanes, in order to give volatility to the fuel. The blending values of 90, 95 and 100 iso-octane fuels mixed with varying percentages of 65, 70, and 74 octane number gasolines or isopentane (90 octane number) and then adding tetra-ethyl lead to produce a 100-octane fuel, were shown graphically with an article published in NATIONAL PETROLEUM NEWS, July 28, p. R-57.

In some cases isopentane is blended with iso-octane and straight-run gasoline in order to provide the required front end volatility for the iso-octane. The volume of isopentane is generally restricted to about 15%. The results of blending 100 iso-octane fuel, 74 octane number aviation straight-run of 7 pounds Reid vapor pressure, and isopentane with 3 ccs. of lead to produce 100 octane number are shown in Table 15.

Table 15

Composition of 100-Octane Fuel Containing 3 cc. T.E.L./Gal.

Per cent Isopentane	Per cent Aviation Gasoline	Per cent Iso-octane	Reid Vapor Pressure Lb./Sq. In. at 100° F.
0	38.0	62.0	4.0
10	37.2	52.8	5.8
17	36.7	46.3	7.0
20	36.4	43.6	7.7
30	35.7	34.3	9.5
40	34.9	25.1	11.4
50	34.1	15.9	13.3

The importance of iso-octane in aviation fuel has been established not only for special uses such as military aviation and high-revenue transport. One may readily predict that within a short time all passenger planes will be operated with motor fuel of 100-octane number or higher.

The dominant position of polymerization in the economy of motor fuel production is also definitely established in that small amounts of polymer gasoline may be used to correct an octane number deficiency in the gasoline production of the refinery and thus function to balance the quality of motor fuel produced.

Summary

1. The polymerization process is one of the most important developments in the petroleum refining industry. More than 9 billion gallons of polymer gasoline may be produced yearly from the hydrocarbon gases in the United States, of which over one billion gallons may be iso-octane fuel of 95 to 100 octane rating.

2. Three modifications of the polymerization process have been described. 1. Polymerization of hydrocarbon gases containing propene and butene; 2. Pyrolytic cracking of butanes (and also propane) to produce olefin hydrocarbons followed by catalytic polymerization to produce polymer gasoline; 3. Selective polymerization of normal and isobutene and hydrogenation of the resulting octenes into iso-octanes.

3. A commercial plant has been described processing daily 13,070,000 cubic feet of cracked gas containing 19.2% of propene-butenes, polymerizing 79.5% of these olefins and producing 1,080 barrels of true polymer in addition to 974 barrels of butanes. When treating a cracked gas containing 25.4% of propene-butenes at the daily rate of 13,874,000 cu. ft., a total of 1,474 barrels of true polymer was produced and 1,152 barrels of butanes. The percentage of propene-butenes polymerized was 86.5%. In another commercial plant treating approximately 1,500,000 cubic feet of gas per day containing 38% propene-butenes, the production was 250 barrels of polymer gasoline with a polymerization of 89% of the propene-butenes present.

4. A commercial plant comprising a combination butane cracking and catalytic polymerization process charging butane at the daily rate of 1,090 barrels producing 402 barrels of polymer gasoline made up of 109 barrels of pyrolytic polymer and 293 barrels of catalytic polymer gasoline.

5. A commercial plant has been described treating butane-butene mixtures to selectively polymerize the normal and isobutenes contained therein having a daily capacity of 1,300 barrels of butane-butene fraction from which was produced 347 barrels of iso-octenes. The iso-octenes are catalytically hydrogenated to iso-octanes, the latter having octane ratings of from 90 to about 100 dependent upon the conditions under which they are produced.

6. The economic position of the polymerization process for the production of polymer gasoline to improve the octane rating of the refinery output or as a step in the process of making iso-octanes is now in relatively wide use in the oil industry.

How Conservation Is Being Effected

N. P. N. News Bureau

CHICAGO, Nov. 9. — Remarkable accomplishments have already been made in this country in the furtherance of the principles of conservation of oil resources, George A. Hill, Jr., Houston Oil Co., Houston, brought out in an address to the American Petroleum Institute here Nov. 10, on "Trends in the Oil Industry." He listed these developments as follows:

1—Enactment of comprehensive conservation statutes by state legislatures in Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, Texas.

2—Enactment of economic waste and or market-demand statutes by Arkansas, Kansas, Louisiana, New Mexico, Oklahoma, Texas.

3—Orders of state regulatory bodies, such as those in the same six states.

4—The Interstate Oil Compact Commission, approved by Congress and ratified by New Mexico, Oklahoma; Kansas, Colorado, Texas and Illinois.

5—Statistical and other services of the U. S. Bureau of Mines in forecasting consumptive demand.

Chemical Industries Expo.

The sixteenth Exposition of Chemical Industries is expected to be larger this year than in several years. The exposition will be held at Grand Central Palace, New York, Dec. 6-11. Many displays will demonstrate modern methods for meeting the needs of the unit process industries of chemical engineering.

Of interest to refiners will be the display of instruments for automatic operations and control of processes. The role of metals and alloys in chemical engineering construction will be represented by exhibits of ferrous and non-ferrous metals with various types of corrosion resistance. Pumps, compressors and blowers will feature the plant equipment section of the exposition.

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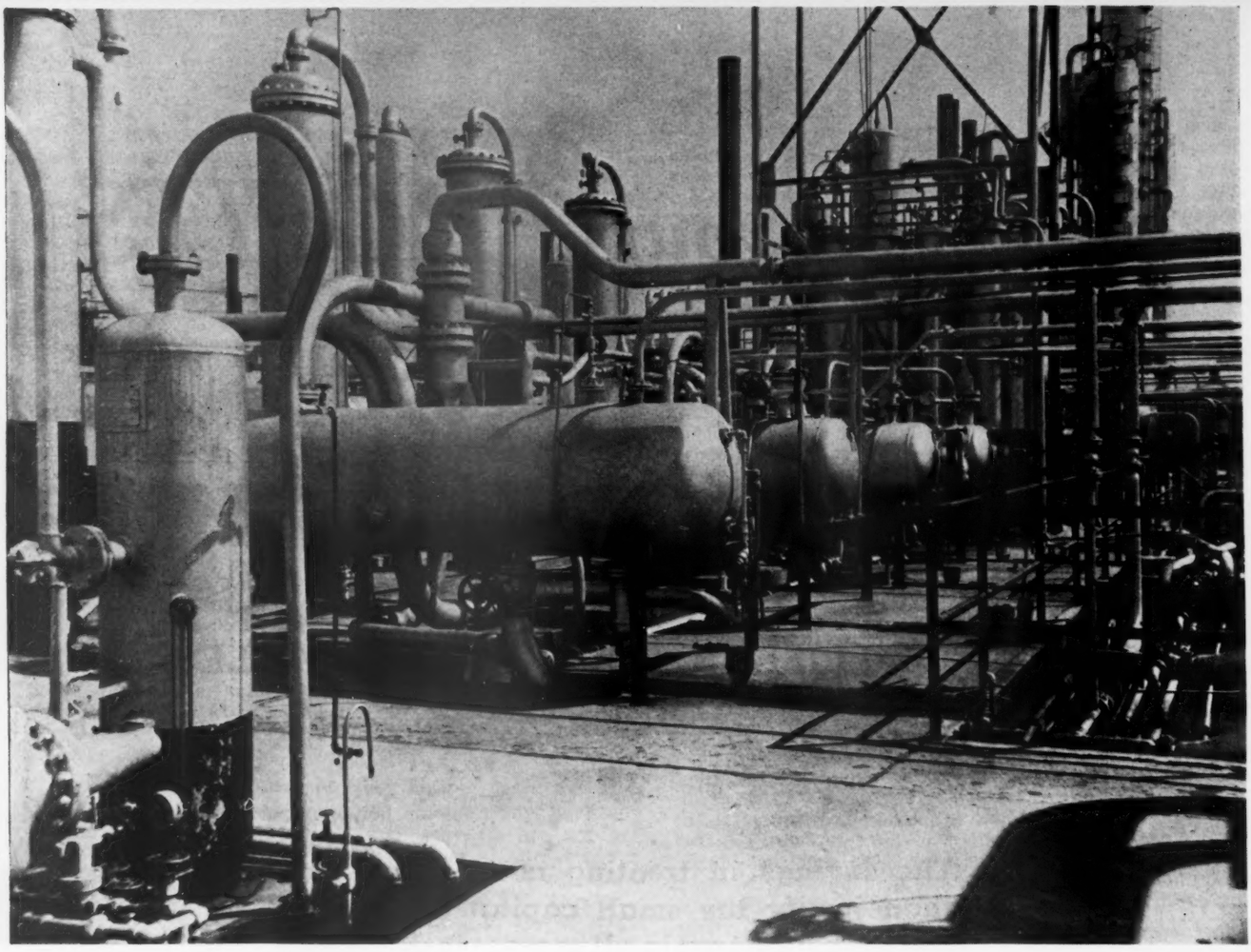

View of Shell Oil Co.'s polymerization plant

729.7
751.2

Iso-Octane Yield Doubled By "Hot Acid" Process*

By S. H. McALLISTER**

Abstract

● Continued improvements in automobile and airplane engines have called for "tailored fuels" of high octane number. These fuels are obtained by the polymerization of the lower olefins found in Dubbs pressure distillate. The Shell Companies have been producing *iso*octane from *iso*butylene in commercial scale for some time. Increasing demands for fuel having an octane number of 97 or better have led to the development of a modification of the original *iso*octane process. This method uses hot sulfuric acid as a catalyst; a portion of the normal butylenes is polymerized along with the *iso*butylene.

Almost double the yield of octane is obtained from the same fuel stock and these, when hydrogenated, have an octane number nearly equivalent to that of pure *iso*octane. The process is in full commercial operation.

CONTINUED improvements in automobile and airplane engines have called for "tailored fuels" of very high anti-knock rating. The major source for such fuels lies in the polymerization of the lower olefins, and today there are a number of different types of commercial polymerization units in operation. The potential production of polymer gasoline has been estimated as over a billion gallons per year; and the advantages, both from an economic and conservational standpoint, have already been pointed out by Dunstan,[1a] Egloff[2], Ipatieff,[3] and others.

The broad field of polymerization and the relative advantages of the various methods will not be reviewed here. This discussion is confined to processes for the production of an octane fuel having an octane rating of 98 to 100 from the C_4 fraction obtained from the Dubbs process.

The Shell companies have been producing *iso*octane in commercial quantities by two methods which have been developed by them. The feed stocks used vary at different refineries, but a C_4 fraction containing 18.5 per cent *iso*butylene and 28 per cent normal butylenes might be chosen as representative of that available at a California refinery. The first commercial process used in the spring of 1934 was a cold-acid process.

The processing unit (Fig. 1) consists of two sections:

*Presented before Am. Pet. Inst., Nov. 12, 1937, under the title, "The Catalytic Polymerization of Butylenes by Sulfuric Acid."

**Shell Development Co., Emeryville, Calif.

Cracked gasoline production outstrips straight run gasoline for the first time

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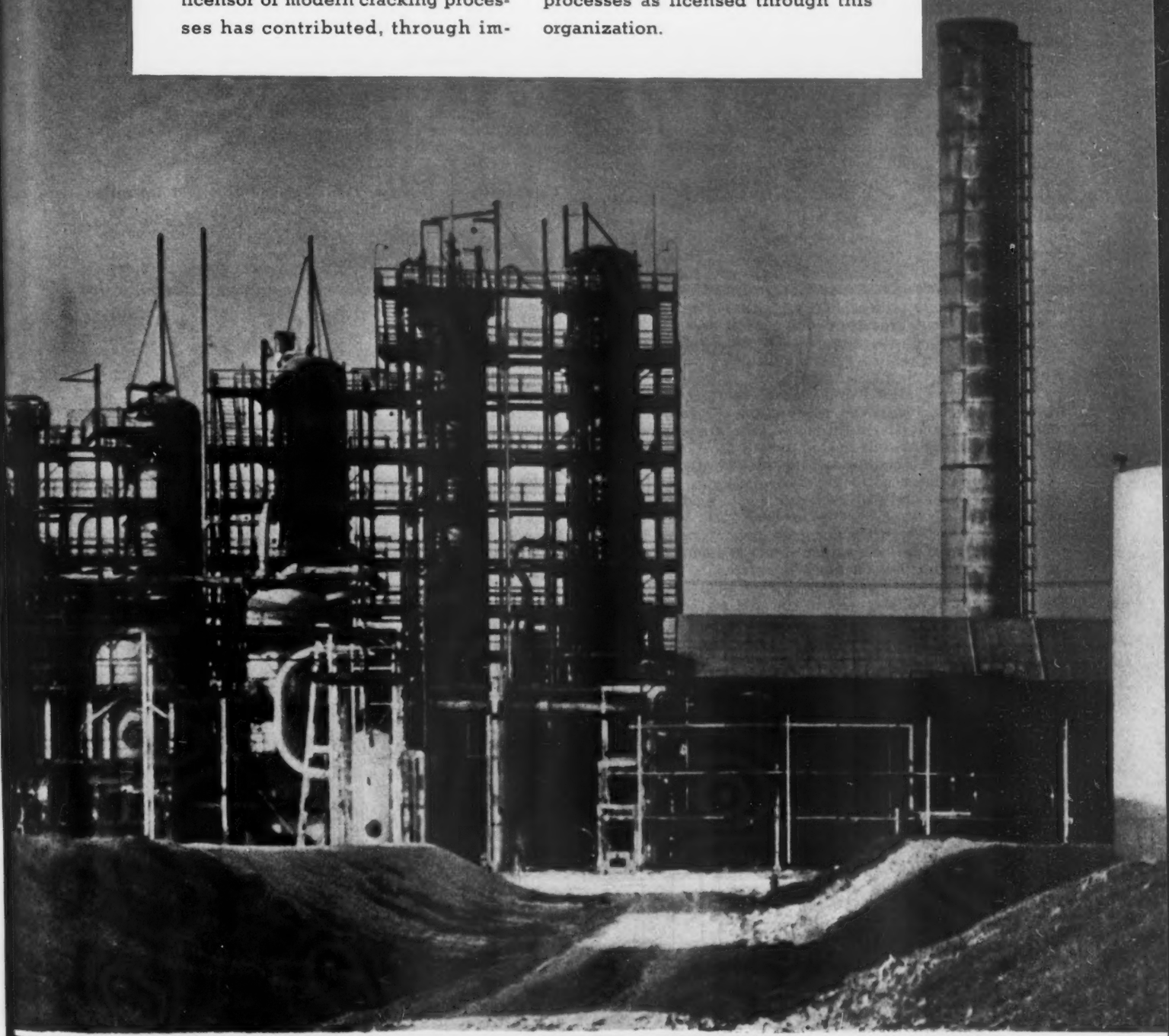

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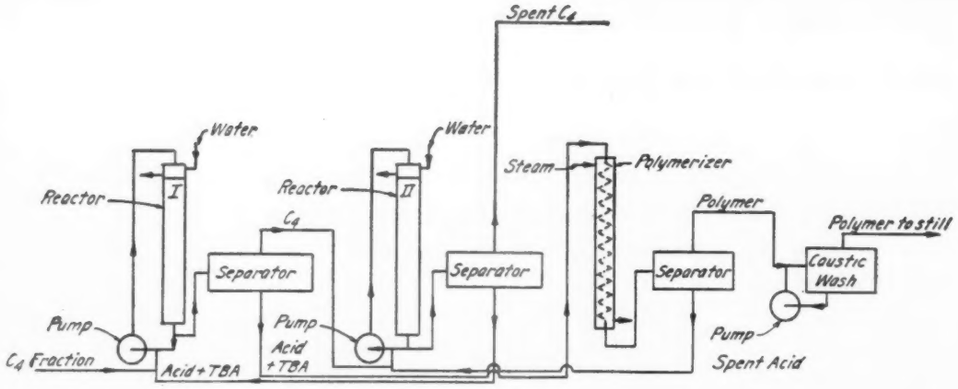

Fig. 1. Simplified flow-diagram of cold-acid iso-octane unit

an absorption section and a polymerization section. The liquid hydrocarbon is contacted with 60 to 70 per cent sulfuric acid at 20 to 35°C. countercurrently in two stages. Under these conditions the *iso*butylene, which is the more reactive of the olefins, is selectively absorbed into the acid phase. The absorption is an equilibrium reaction, and the amount of *iso*butylene absorbed depends upon:

1. *Acid strength:* The stronger the acid, the more complete is the absorption of the *iso*butylene below limits where polymerization occurs. However, if the absorption is to be selective for *iso*butylene, acids of less than 70 per cent strength should be used or the normal butylenes will also be absorbed.

2. *Acid-to-alcohol ratio in the acid phase:* The higher this ratio, the more complete the absorption.

3. *Temperature:* The lower the temperature, the more complete the reaction. However, temperatures above 20 and below 40° C. are preferable if a high reaction rate is to be obtained without premature polymerization.

Under the proper operating conditions it is possible to absorb up to 90 per cent of the *iso*butylene without appreciably absorbing the normal butylenes.

The acid phase, after it has reached the desired degree of saturation with *iso*butylene, is separated off from the hydrocarbon phase and passed through a separate polymerization unit consisting of coils heated to 100° C. The reaction is complete in about a minute, and the products are stratified —the acid being returned to the absorption unit, while the polymer is washed and distilled. With 65% acid the polymer averages about 75% di*iso*butylene, the rest being trimers. With weaker acids a higher dimer content is obtained. After mild hydrogenation of the di*iso*butylene cut, *iso*octane (2,2,4-trimethyl pentane) is obtained.

This cold-acid two-stage process has been in use for some time, and is still the most suitable method of preparing pure *iso*octane. However, on the basis of the total olefins present in the C_4 fraction, the yield of octanes is relatively low; not more than 67% of the *iso*butylene is converted to *iso*octane; i. e., less than 26.7% of the total olefins in a feed stock containing 46.5% olefins. Increasing demands for polymer of 98 to 100 octane number has led to the development of the present hot-acid process, in which almost twice the yield of octanes may be obtained from the same feed stock.

TABLE 1

Comparative Efficiency, Cold-Acid and Hot-Acid Operation

	Cold Acid 65% Acid 30-35° C.	I 65% Acid 80° C.	II 65% Acid 90° C.
Fuel Composition:			
*Iso*butylene, per cent by weight	18.5	18.5	9.1
*n*Butylene, per cent by weight	28.0	28.0	20.6
Butanes, per cent by weight	53.5	53.5	70.3
Products:			
*Iso*butylene, %	2.4	0	0
*n*Butylenes, %	26.6	15.1	11.4
Butanes, %	53.5	53.5	70.3
Polymer, %	17.5	31.4	18.3
*Iso*butylenes polymerized, %	87	100	100
*n*Butylenes polymerized, %	5	46.0	44.5
Total olefins polymerized, %	37.5	67.5	61.5
Composition of Polymer:			
Sulfur (ASTM), %	0.01	0.03*	0.062*
Octenes, %	75	88	92
Octane rating of hydrogenated octenes	100	99.2	98.8

*Negligible sulfate esters present.

Hot-acid polymerization

The hot-acid polymerization process was a direct outgrowth of the former process. When the temperature of the acid absorption reaction is raised, the absorbed *iso*butylene present in the acid phase condenses to polymer, and this is re-absorbed into the hydrocarbon phase. At temperatures above 60° C. this polymerization is sufficiently rapid that the absorbed *iso*butylene has only a transitory life in

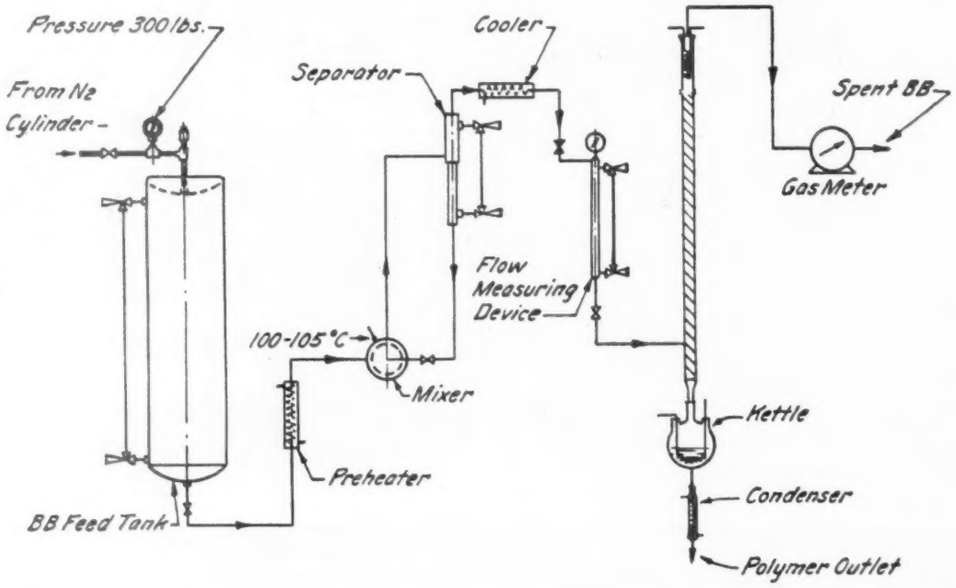

Fig. 2. Essential features of experimental hot-acid polymerization plant

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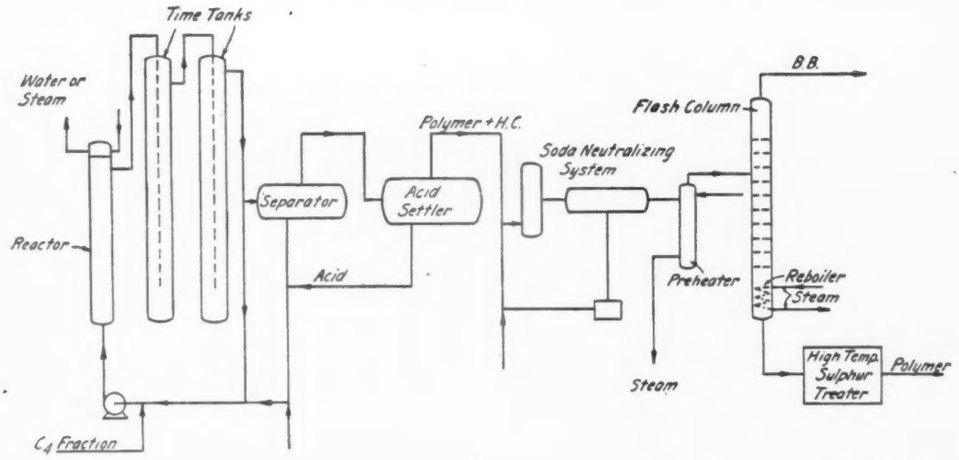


Fig. 3. Flow diagram of hot-acid polymerization process

the acid phase, and the process becomes truly catalytic. The net effect of this is to force the absorption reaction to completion by maintaining the acid phase in a spent state. Thus it is possible to recover all of the *iso*butylene as polymer.

Raising the temperature also has the effect of reacting a portion of the normal butylenes, and these are absorbed into the acid layer principally in the form of acid sulfates. While the normal butylenes do not polymerize with themselves as readily as does *iso*butylene, in the presence of *iso*butylene they will react rather rapidly to form interpolymer. Thus, under proper operating conditions, it is possible to react up to an equal quantity of normal butylenes and *iso*butylene and, as the interpolymer on hydrogenation has an octane number nearly equal to that of pure *iso*octane, nearly double the yield of polymer is obtained without seriously sacrificing octane rating.

Besides the favorable effect on the olefin absorption, hot-acid operation has a further advantage in that polymer as formed passes into the hydrocarbon phase, and is diluted by the inert butanes; its activity is thereby reduced, and there is less opportunity for trimer formation or re-arrangement to polymers of lower octane number. The result is that the polymer is 85 to 90% octenes as against 75 to 80% for the old or cold absorption process. A comparison of the efficiency of the two processes is shown in Table 1. The increased yield of octenes is readily apparent.

Laboratory investigations

The results obtained by the process are dependent upon the mechanical system used, as well as upon chemical factors, such as acid strength and temperature.

A number of experimental reaction systems has been studied. These consisted of packed towers, heated coils through which the reactants were rapidly passed, a reactor employing jet injection of the hydrocarbon into towers containing acid and a single mixer-type reactor. This latter arrangement, shown in Fig. 2, proved to give the best results.

In this system the incoming feed is diluted with a much greater volume of the acid-hydrocarbon emulsion which contains practically no unreacted *iso*butylene. Thus the ratio of *iso*butylene to normal butylenes is very low, and interpolymerization is greatly favored; whereas in the coil or tower reactors co-polymerization of the *iso*butylene is favored owing to its higher initial concentration and much greater reaction rate.

Using the mixer type of reactor, the effect of the several variables in the reaction was experimentally determined. It was found that:

1. The effects of temperature and acid strength are closely interrelated. Acids ranging between 63 to 72% by weight can be used at temperatures from 75 to 100° C., the higher acid strength being used with the lower temperatures. It is preferable not to use stronger acids or higher temperatures, as formation of sulfur dioxide or sulfate ester will then become appreciable. Lower acid strengths lead to longer contact times and enhanced corrosion of the reactor system. However, within the above range, considerable flexibility is allowed without appreciably altering the results which are obtained.

2. The size of the acid phase also affects the reaction. The larger the acid phase, the more rapid is the reaction. However, for commercial operation in the above limitations of acid and temperature, there seems to be little advantage in using more than a 1: 1 or up to 2: 1 ratio of acid to hydrocarbon.

3. The effect of increasing contact time is to increase the amount of reaction until an equal quantity of *iso*butylene and normal butylene is reacted. Above this, large increases in contact time increase the yields only slightly.

By using combinations of these variables, it is possible to react 90% of the *iso*butylene and 10% of the normal butylene, or completely to react the *iso*butylene and an equal quantity of normal butylenes. This flexibility is an advantage when volatility requirements in winter call for more butanes and butylenes.

Composition of the acid phase

The sulfuric acid used in the process functions as a catalyst, and contains relatively small amounts of organic materials. It is used for weeks or months without change, fresh acid being added from time to time merely to make up for that lost by mechanical entrainment. The chemical consumption cost is, therefore, very low.

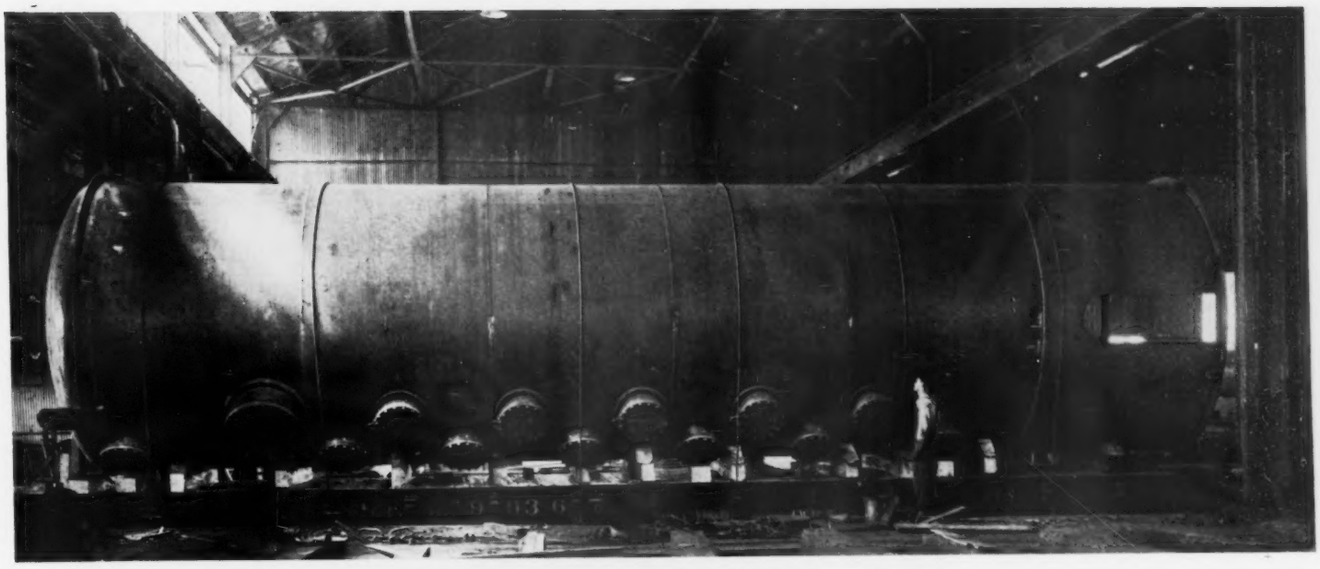
Large-Scale Applications

The laboratory results were directly translated to full commercial-scale plants with the predicted yields. The Martinez polymer plant is shown in Fig. 3. The reactor unit resembles a single stage of the cold-acid process. In fact, the equipment is largely interchangeable. In the plant the fresh feed meets re-cycling emulsion, and the mixture is then rapidly re-cycled through a heat exchanger and time tanks. A portion of the emulsion is continuously withdrawn to a separator, where the acid is separated and returned to the reactor, while the hydrocarbon is worked up for the polymer.

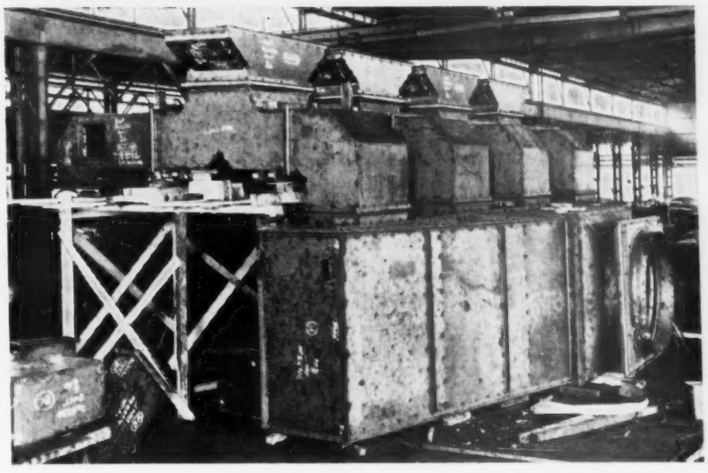
The operation of the unit is extremely simple—one operator per shift being sufficient. No external heat is required, as the exothermic heat of reaction is sufficient to maintain the temperature in the reactor. The return of the acid to the reactor is largely automatic, once the rate of flow is established. In present practice 67% acid is used at approximately 80° C., and a 10- to 15-min. average contact time is allowed.

Polymer Recovery System

As has already been pointed out, the polymer in the hot-acid system is recovered from the hydrocarbon layer. This recovery consists of a caustic wash to remove entrained acids or acid sulfates, a flash tower to strip off the spent hydrocarbon gases, and a high-temperature treater for further sulfur removal. This latter unit serves the valuable purpose of removing the stable sulfate esters which are present in the polymer to the extent of 0.2 to 0.4% calculated, ASTM sulfur. After treatment less than 0.03% sulfur remains, and sulfate-ester removal is substantially complete. The polymer is thus rendered stable to distillation, or



12′ x 51′-3″ Vacuum Steam Still 5/8″ Heads — 1/2″ Shell



(Above)—Breeching for Tube Type Heater

(Right) — Berquist Bins for Carbon Black Plant

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it could be added directly to gasoline without impairing its color or stability.

A distillation curve of the crude polymer obtained from the treater is shown in Fig. 4. It will be seen that the entire product could be added to gasoline, and the boiling range of the octene fraction is very narrow.

The octene fraction is refractionated and hydrogenated under mild conditions. The product obtained averages 98 to 99 octane number. Thus, as already pointed out, by hot-acid operation the yield has been doubled without sacrifice of octane number.

Tables 2, 3, and 4 are set out to show a comparison between pure *iso*octane and hydrogenated interpolymer prepared by this process.

TABLE 2

Comparison of Hot-Acid Octane with Technical *Iso*octane

	Hot-Acid Octane	Technical *Iso*octane
Reid vapor pressure, lb. per sq. in.	2.3	2.1
Color, Saybolt	30+	30+
API gravity, deg	66.5	70.9
Olefin, %	1.5	1.8
Copper-dish gum, mg. per 100 cc.	1	1
Accelerated aging test, mg. per 100 cc.	1	1
Wright acid heat, °F.	24	23
Navy acid heat, °F.	3	3
ASTM Distillation, °F.:		
Initial boiling point	208	205
Dry point	238	235
10-per-cent point	222	210
20-per-cent point	224	210
30-per-cent point	225	210
40-per-cent point	226	211
50-per-cent point	226	212
60-per-cent point	227	212
70-per-cent point	227	212
80-per-cent point	228	214
90-per-cent point	229	215
95-per-cent point	231	216
Distilled, per cent	99	99
Sulfur (Nephelometric), per cent	0.0001	0.0001

TABLE 3

Anti-knock Blending Octane Numbers

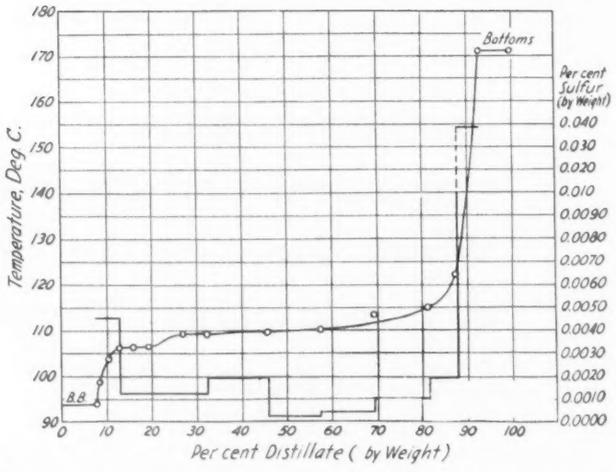
Aviation Base Stock (Per Cent)	Hot-Acid Octane (Per Cent)	Technical *Iso*octane (Per Cent)	Octane No.
100	...	...	74.3
75	25	...	79.1
75	...	25	79.3
50	50	...	84.8
50	...	50	85.2
25	75	...	90.9
25	...	75	91.0
0	100	...	99.1
0	...	100	99.7

Note.—100 per cent hot-acid octane and 100 per cent technical *iso*octane were matched against one another in an engine, and hot-acid octane is found only slightly lower.

TABLE 4

Lead Susceptibility—50 Per cent of Aviation Base Stock and 50 Per Cent of Octanes

Tetraethyl Lead (CC. Per Gal.)	Blend with Hot-Acid Octane	Blend with Technical *Iso*octane
0.0	84.8	85.2
1.0	94.6	94.6
2.0	97.0	97.1
3.0	98.7	99.1



Per cent sulfur in crude, 0.031. All sulfur below 0.02 per cent analyzed by turbidity; above 0.02 per cent, by lamp titration.

Fig. 4. Curve showing a "precision" distillation of polymer product from Martinez, Calif., unit

S. H. McAllister, A.P.I. meeting speaker, has been research chemist with Shell Development Co. since 1930

Corrosion: One question which is of importance in commercial applications is that of corrosion through the use of sulfuric acid at these temperatures. No special alloys are used in any of the plants. The reactors themselves are of mild steel, and the pumps are of standard design. Iron or steel tubing is used throughout . Copper and bronze could also be used, but stainless steel shows very poor service. In one refinery reactors, which had previously seen considerable service under the conditions of the cold-acid process, have been in continuous use on the hot-acid process for 18 months, and are still giving good service. With proper design and reasonable care, maintenance costs are very low. Evidence indicates that wear results as much from erosion as from corrosion, and in any case these are not serious factors when considering a plant of this type. The major cost in a polymer plant is in the distilling and auxiliary equipment, which is common to any catalytic process. The reactor unit itself is relatively inexpensive.

Patents

Various features of these processes are covered by patents and pending applications in the United States and abroad.

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[2] *Ind. Eng. Chem.* 28, 1461 (1936).
[3] *Oil Gas J.* 35 [26] 171 (1936).

Natural Gas Code Published

Publication of "API Code 50-A, Measuring, Sampling, and Testing Natural Gas (Tentative)" is announced by the American Petroleum Institute's Division of Production. While the scope is limited to production and trunk pipeline transportation, it is believed that present duplication of effort will be eliminated and simplification of procedure assured by correlation of data.

Development of the code, begun in 1932, has been under the supervision of a committee headed by F. E. Rice, vice president, Phillips Petroleum Co., Bartlesville. Detailed considerations in measuring, sampling, and testing have been carried on by a technical sub-committee under the chairmanship of G. P. Bunn, also of Phillips.

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"State of the Art" AS SEEN

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By M. G. VAN VOORHIS

Results of Petroleum Analysis

Knowledge of available hydrocarbons in petroleum is necessary to meet demand for specialized properties in products. F. D. Rossini, Annual Meeting, A. P. I., Nov. 8-12.

Potential value of 20 gallons of Mid-Continent straight-run gasoline, having a wholesale value of about $1, is $1000 in terms of the amounts of the five normal paraffin hydrocarbons, *n*-hexane to *n*-decane, which can be separated from it and the current prices listed by chemical supply houses. When existing laboratory methods for separating hydrocarbons from petroleum are successfully worked out on a commercial scale, the cost of producing these hydrocarbons will be considerably less than in other processes.

This is but one of the worthwhile objects of research on the chemical constitution of petroleum now in progress for 10 years in the laboratories of the National Bureau of Standards as American Petroleum Institute Research Project 6. "No other single move by the institute could have been better calculated to impart such a healthy impulse to the growth of various other researches in or important to the petroleum industry."

The knowledge gained, along with accompanying development and improvement of methods of fractionation, serves the industry in two ways, he said. The industry can use the data obtained in producing narrow fractions to improve the control and economy of processes used for producing the broad fractions. Knowledge of the available hydrocarbons in petroleum and of methods for affecting their separation is a necessary requirement in the manufacture of fractions having specialized properties and in the development of a petroleum chemical industry which must deal with substantially pure hydrocarbons.

While broad fractions have satisfied requirements fairly well up to the present, the need for greater efficiency, higher speeds, more concentrated power, use of high pressures and high and low temperatures, and the invention and development of devices for improving the comfort and welfare of man, inevitably leads to the necessity of manufacturing materials of specialized properties which can fill more exacting requirements, Mr. Rossini said.

The range of products now being used successfully in the petroleum industry can be enormously increased once the use of hydrocarbons of higher molecular weight (six and more carbon atoms) as starting material is made commercially possible by their separation from petroleum. Recent reports indicate that separation of several hydrocarbons of more than five carbon atoms per molecule from the gasoline fraction has been accomplished on a semi-commercial scale. Products now being used successfully

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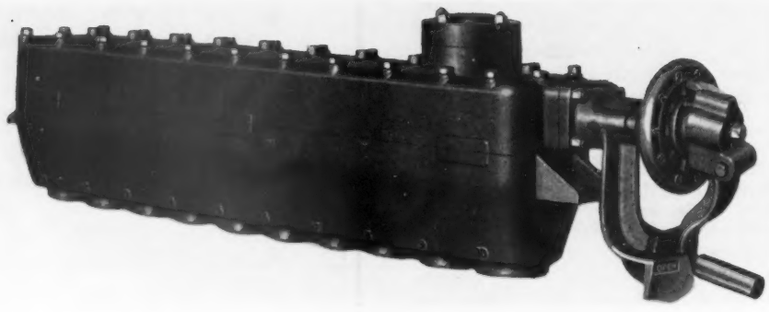

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include methane, ethane, propane, n-butane, isobutane, n-pentane, isopentane, ethylene, propylene, n-butene, and isobutene to produce alcohols, glycols, ethers, oxides, aldehydes, ketones, esters, acids, anhydrides, chlorinated compounds, amines, resins, and iso-octane motor fuel.

In making the investigation a naphtha fraction and a lubricant fraction were dealt with separately. In the naphtha fraction 45 hydrocarbons are definitely known to be in that part of the petroleum normally boiling below 180° C. (356° F.) but a large part of the material boiling between 145° and 180° C. remains to be resolved. In the range from 55° to 145° C. 75% of the volume is assigned to individual hydrocarbons. Present data shows that while actually there may be thousands of hydrocarbons in this fraction, the major part is constituted by a small number of constituents.

All petroleum boiling below 180°C. was found to be composed of paraffin, naphthene, and aromatic hydrocarbons in respective quantities of 60, 30, and 10 per cent. Of the paraffins, four of the five possible isomers of hexane, four of the nine heptanes, two of the 18 octanes, six of the 35 nonanes, and one of the 75 decanes have been obtained. All are estimated to constitute about 1/3 of the petroleum boiling between 55° and 180° C. All of the possible aromatic hydrocarbons boiling below 153° C. have been found. Three trimethylbenzenes have been isolated and preliminary work indicates the presence of *n*-propylbenzene and three methylethylbenzenes. With a few exceptions a purity of 95 mol per cent or better was obtained. Of 45 hydrocarbons listed, 25 had not previously been actually isolated from any petroleum.

The chemical constitution of various fractions of petroleum appears to increase in complexity almost in a geometric progression with increase in molecular weight of molecules. Hydrocarbons of the lubricating fraction contain four or five times as many atoms per molecule as those of the gasoline fraction. The number of possible isomers of triacontane, $C_{30}H_{62}$, is over 4,000,000,000 while for octane C_8H_{18} the number is only 18.

The lubricant fraction was divided into three broad fractions and 600 fractions of "water-white" oil were obtained. Those of lowest molecular weight consisted of one-ring naphthenes (cycloparaffin) and two- and three-ring naphthenes. Those of highest molecular weight consisted of two-, three-, and four-ring naphthenes. There was no evidence of *iso-* or branched-chain paraffins in the "water-white" oil. It is expected that most of the aromatic hydrocarbons will separate in the sulfur-dioxide "extract" along wjith the multi-ring naphthalenes.

On its current schedule, the project has the problem of studying the "extract" portion of the lubricant fraction. This work is following the procedure employed with the "water-white" oil portion. A second problem is the isolation and identification of pure aromatic hydrocarbons (suspected to be n-propylbenzene, 1,2-methylethylbenzene, 1,3-methylethylbenzene, 1,4-methylethylbenzene) from the mixture of aromatic hydrocarbons occurring in that part of the gasoline fraction normally boiling between 152° and 162° C. Third is the exhaustive fractionation of the dewaxed lubricant fraction.

Future work includes separation of the mixture of branched-chain paraffins and naphthene hydrocarbons occurring in the normal boiling range 145-160° C., separation of material remaining in the range 160-180° F., further resolution of certain relatively small "recalcitrant" fractions, containing *iso*-paraffins and naphthenes, still remaining in the range below 145° F., and investigation of the kerosine fraction.

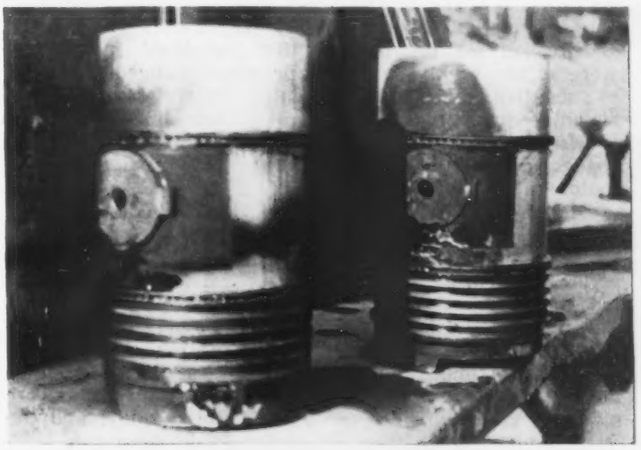
* * *

1937 Road Knock Tests

A. S. T. M. Motor Method of knock testing makes good average but spread of results is too great. T. A. Boyd, Annual Meeting, A. P. I., Nov. 12.

Need for a laboratory test method which will give a more satisfactory evaluation of the relative knocking characteristics of all types of fuels than the present motor (ASTM) method is indicated by 1937 road knock tests. This is in spite of the fact that the correlation between average road rating for all fuels and average motor

Pistons from a Caterpillar Diesel D-11000 Tractor after 4,200 hours operation on an SAE 30 Alox-blended Pennsylvania oil.



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method rating for all fuels is reasonably good. Average of motor method results was more closely correlated with road rating than either the research method or the L-3 method of rating.

Reason for the need is that individual fuels which were either highly sensitive, or which ranged from low to negative sensitivities, deviated appreciably and consistently from the average correlation line. The more sensitive fuels were rated above the motor rating on the road and the less sensitive fuels were rated below the motor rating on the road.

Participants in the test program included 24 companies, 21 of which were oil companies, two major motor car manufacturers, and the Bureau of Standards. Two series of fuels were designated for the work, one of winter volatility and the other of summer volatility. Selection of cars for the tests was based on approximate relative sales volume. Due to the wide participation in these tests, three times as many different cars were used as in the 1934 tests at Uniontown. Actual road tests were made at various points throughout the country, and the results submitted to the CFR Motor Fuels committee.

A. E. Becker, who reported the effect of test conditions on fuel rating, found correlation between road and laboratory values is not a simple problem, but has outlined a number of test conditions which should be taken into consideration. Results of these conditions are to be studied further with road tests to arrive at a better correlation between road and laboratory ratings.

* * *

Ignitability of Diesel Fuel

Cetene number determined from density and average molecular weight is simple and accurate index of ignitability. R. Heinze and M. Marder, Jour. Inst. Pet. Tech., Oct., 1937.

In answer to attacks upon the reliability of laboratory methods for determining the ignitability of diesel oils, proof is offered that proper application of a density method developed by the authors yields cetene values in close agreement with those determined by engine test. While density is preferred as a basis for determining ignitability because it is easily determined and gives the largest range of variations for oils with varying ignitability, other constants can be used.

In conjunction with density or other property it is necessary to take into consideration the average molecular weight of the components of the oil. The authors did this by employing a so-called "Siedekennziffer". This value is a simple average of the temperatures at which 5, 15, 25, etc., up to 95% by volume of the oil are distilled and thus is a basis for average molecular weights of the compounds of which the fuel is composed.

Cetene value as obtained by the C. F. R. motor may be derived in the laboratory by employing a cetene value derived from density and correcting it by subtracting the quantity, 300 minus the Siedekennziffer (KZ), the quantity being multiplied by a constant dependent upon the value of KZ. This is expressed in the following formula:

$$CZ_{eng} = CZ_{300} - (300 - KZ)f$$

KZ	f
200	0.40
250	0.35
300	0.30
350	0.25

The value of CZ_{300} is noted from the parachor corresponding to the fuel. It is possible to obtain the calculated value by means of an areometer based upon the relation of CZ_{300} with density on which the scale shows CZ_{300} values instead of density, thus simplifying the determination of cetene value.

This method takes no account of doped fuels, the ignitability of which cannot be directly determined by physical methods. Adaptability of density in connection with the Siedekennziffer for determination of cetene value was tested on 216 diesel oils of widely varying origin by comparing results with the C. F. R. motor and the laboratory method. Only when cetene values were above 60 were discrepancies high. Its general accuracy and simplicity recommend the method.

Patent Literature OF TODAY

Solvent extraction. No. 2 091 400, *issued Aug.* 31, 1937; *filed March* 22, 1933; *F. W. Sullivan, Jr., W. H. Bahlke, A. B. Brown, and F. F. Diwoky, assignors to Standard Oil Co. (Ind.); one drawing;* 16 *claims.*

Naphthenic compounds and unsaturated compounds are removed from a mixed base lubricating oil by heating and agitating the oil with a polychlorinated organic compound containing a carbonyl group. Paraffinic compounds separate from the solvent on cooling and the solvent and dissolved compounds can be separated. Certain oxygenated-halogen organic compounds such as halogenated ketones [di-(2-chlorethyl) ketone] halogenated acetals (dichlorethylidene diethyl ether), halogenated aldehydes (ortho- chlorbenzaldehyde and chloral) and halogenated ketols are said to have remarkable properties for the extraction on undesirable substances.

* * *

Hydrogenation. No. 2 091 831, *issued Aug.* 31, 1937; *filed Aug.* 17, 1931; *E. V. Pongratz and Adam Immel, assignors to I. G. Farbenindustrie Aktiengesellschaft; one drawing;* 2 *claims.*

As a catalyst in hydrogenation, a hydrocarbon oil soluble molybdenum salt of a naphthenic acid, not entirely decomposable in the oil under conditions of reaction, is used.

* * *

Cracking. No. 2 091 892, *issued Aug.* 31, 1937; *filed Feb.* 21, 1935; *R. K. Stratford, assignor to Standard Oil Development Co.; one drawing;* 2 *claims.*

A clay previously spent in decolorization treatment of lubricating oils is mixed with a fluid stream of relatively high boiling oil and passed through cracking tubes. Cracked products pass to a zone where vapors are separated and the residue withdrawn. Vapors are fractionated to separate a lower boiling fraction including motor fuel constituents and a reflux condensate and products are contacted in vapor form with spent adsorbent clay. This clay is utilized as at least a portion of the clay introduced into the fluid stream of oil prior to its passage through the heating zone.

* * *

Cracking. No. 2 094 476, *issued Sept.* 28, 1937; *filed Feb.* 24, 1932; *G. Stern and R. Hasenclever, assignors to I. G. Farbenindustrie Aktiengellschaft; one drawing;* 3 *claims.*

Fresh oil is distilled and vapors removed to be cracked. Constituents boiling above 400° are condensed without condensing substantial parts of the vapors of normally liquid hydrocarbons boiling in the range of the initial oils and of the light oils formed in the vapor phase cracking. A part of the uncondensed portion of the cracked vapors, consisting mainly of normally liquid hydrocarbons condensing within the boiling point range of the light oils and the initial oils, is added to vapors of fresh oils to be cracked in an amount of 1.5 to 20 times the amount of the vapors of fresh oils. Combined vapors are passed without intermediate condensation into the cracking chamber and the uncondensed portion of the cracked vapors is collected by further condensation.

Activities OF EQUIPMENT MANUFACTURERS

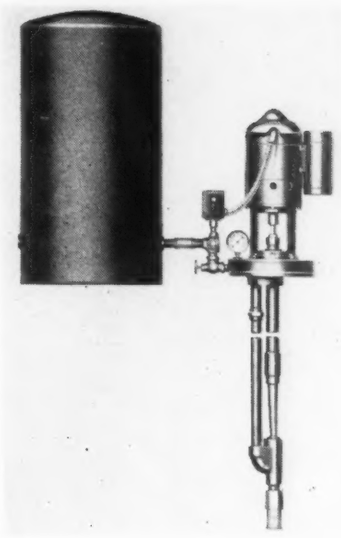
Flu-Still Hose

A new Flu-Still cleaning hose, Style 3332, has been developed by The Goodyear Tire & Rubber Co., Akron, O. The hose is designed to resist high temperatures met in this service. The wrapped plies of heavy duck forming the body of the hose are coated with a heat-resisting compound. Further heat resistance is attained by a closely braided layer of asbestos cord applied over the duck plies and an oval wire is wound around the cover of the hose to provide strength and protection from abrasion.

* * *

Duplex Power Pump

Fairbanks, Morse & Co. has developed a new line of duplex power pumps, described in Bulletin 6130, for oil field service, fire protection and for general service requiring pressures up to 800 pounds per square inch and capacities to



187 gallons per minute. Among the features are herringbone gears said to insure a smooth flow of power to the fluid end with a minimum of vibrations. Inquiries should be addressed to 900 S. Wabash Av., Chicago.

* * *

E. D. Emerson Appointed

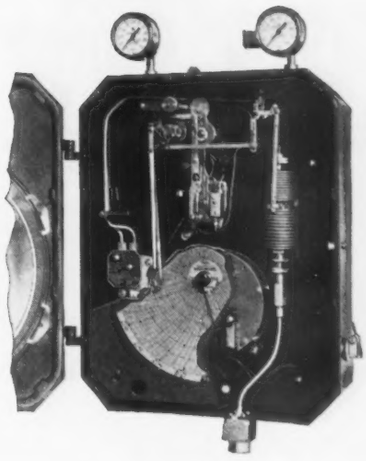
The Babcock & Wilcox Co. announces the appointment of E. D. Emerson as New York manager of domestic and export sales. Emerson was formerly with Jones and Laughlin Steel Corp. and Air Reduction Sales Co. B. M. Jones has been transferred from Beaver Falls to the company's New York office.

* * *

Pressure Measurement

The critical relationship between absolute pressure and the physical properties of gases and vapors under low pressure is too frequently ignored, according to engineers of Taylor Instrument Co., Rochester. Unless fluctuations in barometric pressure are considered, errors in measurement and serious variations in processing may result, it is said.

A new line of instruments is now announced by Taylor for indicating, recording and controlling absolute pressure and therefore compensating all barometric variations. The pressure element consists of a flexible phosphor-bronze bellows, to the inside of which the pressure medium un-



der measurement is communicated. Connected with this assembly and opposing its action is a second identical metal bellows which has been evacuated and sealed, thus comprising an atmospheric-pressure compensator.

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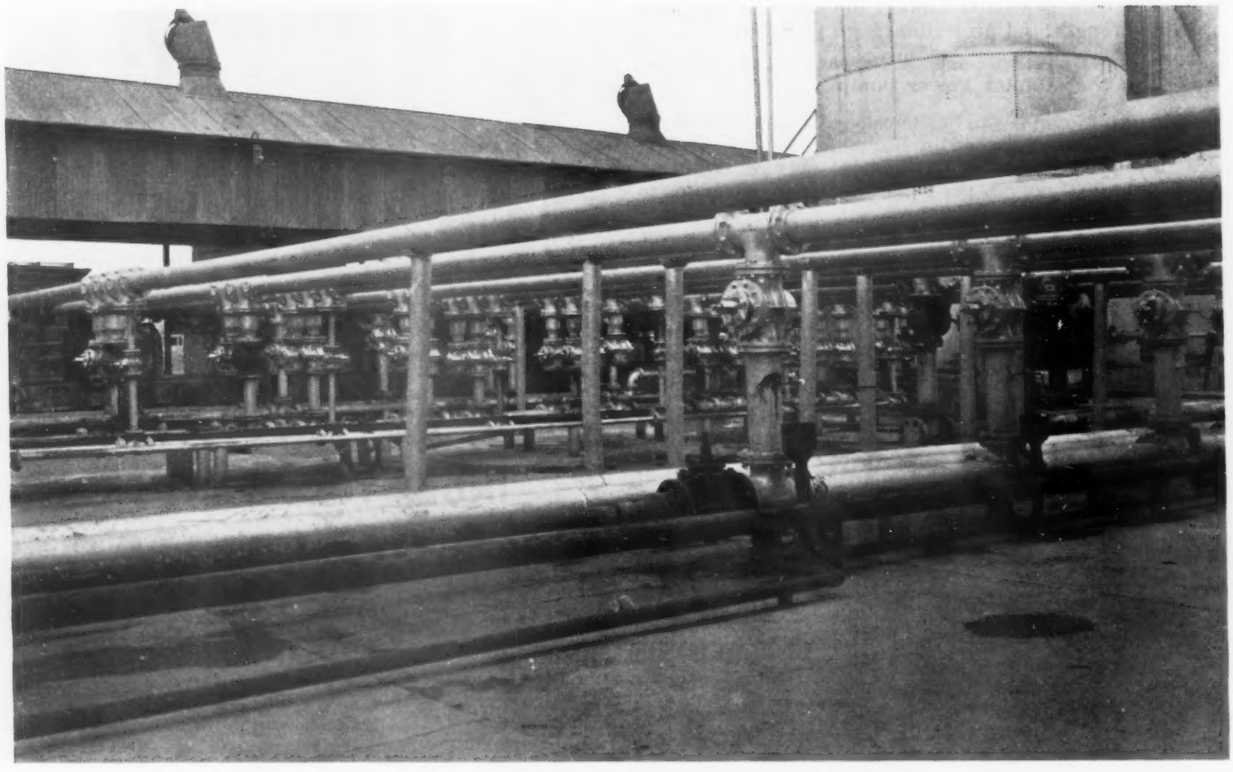
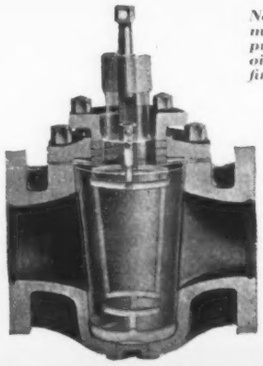
No *"time out"* for NORDSTROM VALVES



Nordstroms stay in and play "heads up" ball where other valves may require "time out" for repair or replacement. We know that the majority of all Nordstrom valves installed in refineries are still in service and will remain in use indefinitely and that even the oldest of these are as efficient today as they were in 1920. We do not *claim* that *every* Nordstrom valve will give fifteen, ten or even five years of service, but we can confidently assert that every Nordstrom will serve *longer* than any other type of valve, particularly where difficult conditions of temperature and pressure are predominant. Nordstrom valves neither ask nor expect quarter.



Nordstrom high-pressure valves, mostly 6", 125 pound size, on pump lines and manifold of light oil treating agitators in Texas refinery.

In Nordstrom valves, a plastic lubricant is efficiently distributed over the entire bearing surfaces by means of the exclusive, patented "Sealdport" method of hydraulic lubrication. There is no "break" or opening in this pressure seal where line contents can channel through. Internal and external leakage is prevented. Working pressures up to 3,000 pounds; temperature −60° to +609°F.

NORDSTROM VALVES

LUBRICATED PLUG

MERCO-NORDSTROM VALVE CO.
A Subsidiary of
PITTSBURGH EQUITABLE METER CO.
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PATENTED "SEALDPORT" LUBRICATION

1929 Was Only a Good Start For Gasoline Consumption

By **M. G. VAN VOORHIS**
N. P. N. Staff Writer

AMAZING as has been the growth of gasoline consumption since 1929, with but little halt during the depression years and never dipping below the level of 1929 consumption, the demand for other oil products during this period has also shown a striking increase.

While the demand for all oils has not increased by a third of the entire 1929 volume, as in the case of gasoline, as depicted on the cover of this issue, the figures for all oils show a sharp contrast with those for basic industries, such as steel and coal and with general industrial activity, as indicated by freight car loadings and employment.

The chart on the cover of this issue graphically illustrates the growth in gasoline sales since 1929, as compared with the trend of industrial activity in other lines

The total demand for all petroleum oils was 1,103,200,000 barrels in 1929, dipping to a low of 938,800,000 barrels in 1932 (Volume Index 0.85), and returning to 1,223,300,000 barrels in 1936 (Index 1.11). These figures may be compared in volume with 349,000,000 barrels of gasoline in 1929 and 465,500,000 barrels in 1936, gasoline sales being roughly a third of those of all oils.

Fuel oil deliveries to foreign and domestic markets totaled 411,000,000 barrels in 1929, came back to 395,000,000 barrels in 1935, and indications for 1936 are a total of 440,000,000 barrels.

However, fuel oil is more closely related to industrial activity in general than gasoline. If domestic heating oils are isolated the index would lie far above that for gasoline. Thus a consumption of domestic heating oils of 35,333,000 barrels in 1929 compares with 76,853,000 barrels in 1935 and indications point to a large increase in 1936 over 1935. Heating oil probably represented a third of the 1936 fuel oil consumption.

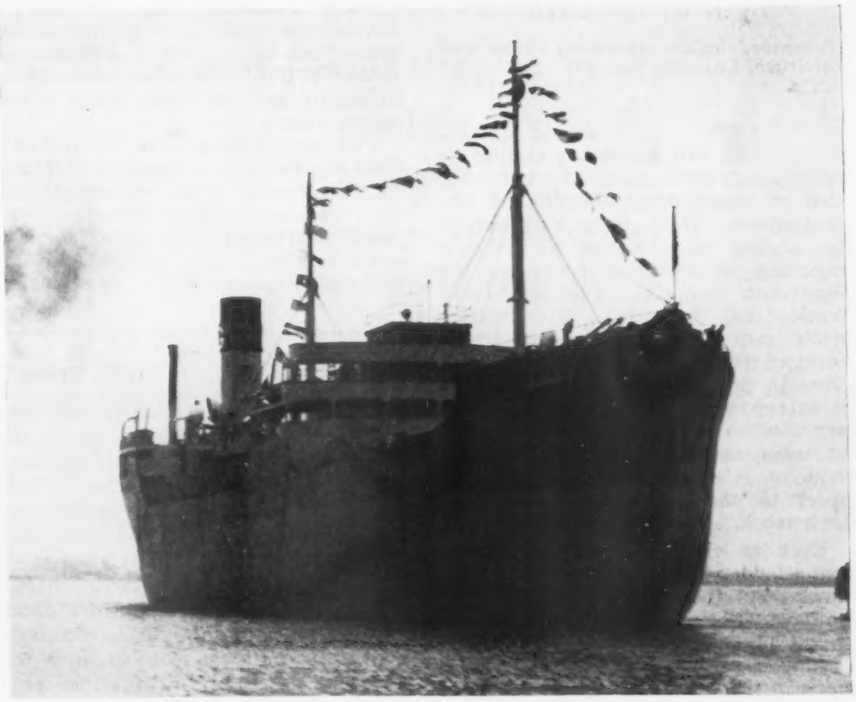
Domestic demand for kerosine also has a better record of proportionate increase than gasoline. Demand rose from 36,032,000 barrels in 1929 to 51,479,000 barrels in 1936, due largely to its use as range oil. Lubricants showed the effect of the depression similar to the industries shown on the front cover. In 1929 the demand was 23,609,000 barrels which came back to 22,676,000 barrels in 1936. Demand for wax was 274,572,000 pounds in 1929 and rose to 301,488,000 pounds by 1936.

Crude production first rose above 1929 figures in 1936 to supply the increasing demands but was influenced by the drop in crude stocks during this period from 429,191,000 barrels in 1929 to 288,184,000 barrels in 1936. Refinery runs to stills totaled 912,191,000 barrels in 1929, dropped below that figure in 1932-3-4, and totaled 1,068,134,000 barrels in 1936. That such a relatively larger proportion of gasoline is being secured from crude oil now is due to improved methods of refining.

Consumption of Gasoline as Compared with General Industrial Activities

	Gasoline Consumption Gallons	Steel Ingot Production Gross Tons	Freight Car Loadings (Av. Weekly) Cars	Coal Consumption Tons	Employment Index
1929	14,677,554,000	56,400,000	1,014,000	591,012,000	100.0
1930	15,786,040,000	40,700,000	879,000	522,617,000	87.2
1931	16,621,104,000	25,950,000	715,000	430,277,000	73.7
1932	15,500,366,000	13,700,000	543,000	357,417,000	61.1
1933	15,438,324,000	23,300,000	557,000	371,348,000	65.8
1934	16,587,356,000	26,100,000	591,000	402,543,000	75.0
1935	17,716,811,000	34,100,000	606,000	411,392,000	78.3
1936	19,565,922,000	47,800,000	688,000	471,402,000	83.5

1—Gasoline consumption in U. S. by automobiles as compiled by the American Petroleum Institute.
2—Steel ingot production and consumption are virtually synonymous. Figures from American Iron and Steel Institute.
3—Freight car loadings are derived from American Railway Assn. statistics published by Standard Statistics Co.
4—Coal consumption tonnages are derived from statistics published by the U. S. Bureau of Mines.
5—Employment indices are derived from U. S. Bureau of Labor Statistics indices based on years 1923-1935.



Launching of the Gulfwave, new tanker of Gulf Oil Corp., took place recently. Mrs. J. F. Drake, Jr., acted as sponsor. Her father-in-law is Col. J. F. Drake, president of Gulf Oil Corp. The Gulfwave is the 314th vessel, and the 39th tanker, launched at the Sparrows Point, Md., plant of Bethlehem Shipbuilding Corp. It is the third of four 11,000-ton tankers built for Gulf. The overall length is 442 feet. She will carry 3,500,000 gallons

Problems Occasioned By Style in Truck Tanks

By J. W. SINCLAIR*

(Presented before American Petroleum Institute, Chicago, Nov. 10)

THE source of styling in truck tanks is basically different from that of other developments and improvements. There is no justification for styling as a matter of delivery necessity or operating economy. No legislation compels us to make our truck tanks beautiful. Style within itself contributes nothing to driver comfort that cannot as well be secured through proper design in the conventional-type truck. Streamlining of assemblies, so important in the reduction of wind resistance in faster-moving vehicles, is of scant value in this respect to the relatively slow-moving tank truck.

Even as clothes do not make the man, fender pants do not make the truck. Yet the fact remains that we do have with us the "styled" tank, and in all probability it will continue to occupy a definite place in our operations in the future.

The trend toward styling is not as recent as is ordinarily believed. As early as 1926 tank vehicles in limited numbers appeared with a modified form of "skirting." These few initial adventures must have proved a bit premature, as no further activity was evidenced until 1929, when the question of beauty in tank trucks again raised its ugly head.

This second appearance was illtimed, however, from an economic standpoint. In the several years succeeding we were seeking ways of conserving expenditures rather than outlets for any surplus funds which might exist. Nominal and spasmodic efforts, of no major consequence, to lift the face of the tank truck were made in the interval between 1929 and the early part of 1934. It was not until 1934 that the first skirted job with a definite degree of streamlining appeared, and from this point onward the development has been rather rapid.

Style in truck tanks is not different from style in other channels. We have nominal, advanced, and extreme designs.

Nominal styling may be char-

*Union Oil Co. of California, Los Angeles.

Styled Truck Tank Here To Stay

● The styled truck tank has many points in its favor and has been permanently adopted by the oil marketing industry, in spite of some of the arguments brought forward against it, this author points out.

Aside from such factors as occupational pride and the advertising value of the styled tank, it is brought out that streamlining of the tank has accelerated the trend toward better appearance in accessory equipment and has also resulted in improvements in design, effecting greater efficiency.

"Improved vents, dome covers, meter assemblies, faucets, piping layouts, etc. are examples of progress directly attributable to the stimulus of style," this article states. "It is conceivable that this stimulus will continue in a degree sufficient to offset, in a measurable sense, the objectionable features outlined."

Sinclair spoke before the American Petroleum Institute convention session on Automotive Transportation, his subject being "Problems In Operating Truck Tanks." His introductory remarks and a section devoted to regulation of tank operations are omitted here.

Sell in the best market

Domestic burners are bidding against cracking units for the gas oil they need to warm a million and a half of homes—and the need is mounting

Diesel engines are claiming a greater share of gas oil as their numbers increase

Motor cars every season demand more and better cracked gasoline as they grow in numbers and their appetites grow more exacting

The gas oil supply is limited

What is the answer?

Here it is:

Crack more heavy oil and less gas oil

Dubbscracking is the way to do that

The new Equiflux furnace makes cracking of heavy oil easier than ever before

That puts more gas oil into the markets that must have it—and are able to pay the price for it

It puts more money into your pocket

Universal Oil Products Co
Chicago, Illinois

Dubbs Cracking Process
Owner and Licensor

acterized as merely the sensible adaptation of the tank to the type of the vehicle carrying it, plus a restricted skirted area, purposely set high for clearance purposes—and possessing the minimum of frills. This type of unit presents practically no problems not encountered in the conventional open-type of truck, and is universally adapted to all operating areas.

The extreme design, exemplified by the scarab type of assembly, is created and used primarily for its advertising value. By reason of design, it must largely ignore the factors of economy, of initial cost, and of subsequent range of adaptability. The relatively small number of tanks of this type precludes any discussion of operating problems which might be created.

ADVANCED styling may be described as a combination of full skirting and streamlining—with appropriate recognition being given the delivery adaptability range of the vehicle, its utilitarian value, and its cost, both initially and from the standpoint of maintenance and operation. The extent of styling differs somewhat in this group—the major difference being whether or not the tank proper is designed to conform to the contour of the vehicle cab. It is this advanced, although not extreme, group that has increased in numbers very rapidly in the recent past.

The styled truck tank was initially viewed with some concern by operating personnel. It gave definite promise of increased initial cost, greater deadweight, and increased maintenance expense. From the standpoint of flexibility, it appeared a step backward—not only as to interchangeability from one chassis to another, but from the standpoint of delivery adaptability in varying areas as well.

There was no surface indication that operating safety would be advanced; in fact, in a prima facie sense at least the reverse seemed the more reasonable assumption. Susceptibility to driver neglect, always a prominent maintenance problem, appeared to be enhanced rather than minimized. The extent of realization of these fears may best be obtained by a discussion—based on acquired experience with both types—of the relative advantages and disadvantages of the styled and conventional unit.

As in every analysis, the basis of comparison should be established rather definitely. In discussing the styled truck, we confine ourselves to the advanced type, as it is only with this group that sufficient operating experience has been gained to be representative. Both the nominal and extreme types are excluded. In comparative references hereinafter made to the conventional truck tank, we do not necessarily mean the simplest type of delivery unit which it would be possible to build, but rather a compromise type of job which would be built in the event we did not indulge in full skirting and streamlining.

Realized disadvantages of the styled truck may be summarized as follows:

Initial Cost

The styled job costs approximately one-third more than the conventional, and the contribution of interest on investment, taxes, and depreciation to delivery cost is definitely increased.

Deadweight

Full skirting and deluxing increases deadweight of the tank and mounting assembly from 10 to 15 per cent, and as high as 20 per cent in some types. The general effect of these increased weights, however, is largely unnoticed because of the appreciable reduction in chassis weights in later years. However, the increased weight is, nevertheless, present.

Another factor contributing to increased weight is that, in order to approach more rounded or smoother lines of design, the trend has been to decrease the size of the filler domes. The expansion volume or outage is, therefore, virtually transferred entirely to the tank itself. This means that the actual tank capacity must increase to include the outage volume, resulting in increased weight and cost.

Maintenance Cost

No definite data in this respect are as yet available. However, it is certain that increased maintenance costs can be expected, as:

1. The mounting itself offers greater surface subject to damage and costs more to repair.

2. The effect of vibration is more apparent; and, therefore, more frequent repairs are required. The fact that there is so much more to the skirted mounting naturally indicates the necessity for greater attention.

3. Chassis maintenance will be greater because the skirted mounting restricts clearances around the chassis, limits the vision of the workman, and generally slows up maintenance and repair work.

Painting and Cleaning

Painting costs are increased due to greater surface coverage and the fact that a definitely higher caliber of paint job is applied to the styled vehicle. In resultant surface maintenance and cleaning, expense is higher, due to greater surfaces (although this is in a large measure offset by the generally smooth and rounded character of such surfaces) and the fact that a high standard of presentability is demanded of the de luxe job.

Understructure cleanliness presents a definite problem, especially during certain seasons of the year. The vehicle may be entirely presentable on the exterior, and yet carry a shocking degree of filth in the concealed portions of the understructure. Properly to clean this understructure, special equipment is frequently necessary. If this cleaning is not done at regular intervals, labor repair cost is increased.

Universal Adaptability

The styled truck is not as universally adaptable under varied conditions of operation as is the conventional truck—due primarily to reduced clearances as to skirting, to excessive accumulation of mud and dirt on the interior of the understructure, and to greater susceptibility to marring of the side panels when used in orchards, timber or back country. Although, admittedly, once a truck is built, it is apt to have shortcomings under some of a varied number of conditions, the extent of the practical operating range of the styled unit is considerably less than that of the conventional truck.

The question of adaptability has not been of serious concern in the past, because until very recently, the styled group has been preponderantly restricted to large-capacity units, the operation of which, as a matter of economic necessity, is confined to more populated areas where excellent highway conditions prevail. However, styled trucks are now reaching down into the lower capacities. Unless distinct modifications are made in the skirted structure, the operating disadvantages present in outlying areas, in which relatively small-capacity trucks generally work, will definitely restrict their range of adaptability.

Basically, if S.A.E. chassis dimensions are maintained, the transfer of mounting from one chassis to another

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When North Carolina's new state gasoline specifications go into effect Dec. 1, uniform labels, such as the one shown here for regular grade gasoline, will appear for all grades on the pumps of all retail outlets. Labels for premium grade pumps are to be royal blue on a white background; for regular grade, red on a white background; and for motor, black on a yellow background. Under the North Carolina grading law, inspectors will cover the state making gasoline tests at stations. They will travel in automobiles with trailers equipped as traveling laboratories.

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presents no great problem, whether the type of tank be styled or conventional. Exception must be made, of course, in those styled designs wherein the mounting and cab are made integral. However, even the normally-styled units make necessary a far greater degree of definite adherence to S.A.E. chassis dimensions, as the tolerance range with the skirted job is much more restricted.

In view of the increased necessity for adherence to S.A.E. chassis dimensions in the styled truck, it seems entirely appropriate to touch upon the degree to which truck manufacturers are adhering to these dimensions, especially as regards the all-important cab-to-axle dimension.

Page 98 of the 1936 S.A.E. handbook lists recommended standards for "CA" dimensions (distance from extreme back of cab to center line of rear axle) as 39, 48, 60, 72, 84, 102, 120, 138, and 156 in.; and further recommends that "the tolerance on the 'CA' dimensions shall be plus 1 in., minus 0, to avoid possible interference between the cab and the body."

It is somewhat alarming to observe the high percentage of current truck chassis of standard wheelbase models which do not conform to such recommended practice. The truck specifications table in the October 1937 issue of the Commercial Car Journal lists approximately 444 conventional models on which the "CA" dimension of the standard wheelbase is shown. Of this number approximately 52 per cent, or more than half, not only do not conform therewith, but will not conform even though the tolerance is increased to 2 inches plus and 2 inches minus. Bear in mind that the vehicle models referred to are current, whereas the S.A.E. recommended practice has been in effect for a number of years.

The picture with respect to the more recent c.o.e. (cab over engine) types is not materially different. Of approximately 65 c.o.e. models so listed, approximately 40 per cent do not conform to the recommended standards, even though the greater tolerance above mentioned is applied.

Are these recommended S.A.E. standards soundly based, all factors being considered; and, if so, why the wide deviation in current conformity?

Coincident with new developments of any character is the human tendency to resist change. This resistance sometimes takes the form of creating obstacles and objections not borne out by subsequent experience. The development of the styled truck has been no exception. Among those objections originally raised, but since either disproved or at least not substantiated by resultant operating experience, may be listed the following:

Some concern was originally expressed that the newer types of equipment might render obsolete, or at least partly inadaptable, current loading-rack designs. Such fears have not materialized, and loading-rack problems have not been increased by the styled truck. It is true that material changes have been made in the past few years in loading racks, but the advent of submerged loading is the major contributing factor.

Storage Space

Full-skirted units originally gave promise of requiring increased widths for storage stalls, thus occupying valuable ground area. Although truck-storage space per unit is now approximately 20 per cent greater than in the past, the increased size and capacity of the average vehicle has been the major contributing factor rather than the type of vehicle.

Calibration

Calibration is not affected, regardless of even extreme design, if the "liquid-displacement" method is used. Extreme design imposed on the tank shell itself will affect calibration only if the "strapping" method is used. As the latter method is seldom followed with respect to truck tanks, the general adverse effect is negligible. If care is exercised in the proper installation of capacity indicators as to visibility and accessibility, no particular problem in this respect is encountered.

Driver Delivery Operations

It is true that a greater degree of ingenuity is sometimes required on skirted units to insure the desired accessibility of the various items of delivery equipment. The earlier models were in a degree objectionable in this respect. However, improved design has so minimized this factor that limitation of driver delivery operation is practically negligible. On the other hand, the centralization of driver delivery units or "tools" had developed with skirting; and protection from dust, mud, grime, and grease is provided. It would seem, therefore, that acceptability from the driver's viewpoint has been increased.

Admittedly, the styled unit, in order to be effective, requires a higher degree of constant presentability than the conventional type. An unkempt deluxe job is as adversely conspicuous as a sore thumb. Concern has been properly expressed as to whether the driver would meet this additional responsibility. Greater effort is required by reason of the higher standard and also because of increased area requiring cleaning and wiping. On the other hand, this increased effort is offset in a definite degree by the absence of protecting obstacles and the more generally rounded by acceptable contour of the entire assembly.

It is still a bit early to determine definitely the ultimate outcome. Almost any man will react favorably towards a device or article until the novelty wears off. Experience thus far has been generally favorable. We would possibly be too optimistic if we assumed that the deluxe character of the unit will, in the long run, in itself be an incentive to better driver care.

However, the greater ease with which careless driver treatment can be detected is a factor. Consciousness on the part of "management" as to the advertising value of the styled unit will no doubt be an incentive to allot more of the tank-truck salesman's time to the care of vehicles of this type.

Operating Safety

Concern was expressed that the "style" trend might tend to increase operating and highway hazards. Basically, the so-called "styled" truck does not, by reason of design, create a hazard not heretofore encountered. The fact that the truck may be designed for style does not necessarily preclude items tending to reduce accidents. In fact, the new design within itself frequently incorporates items tending to reduce hazards heretofore encountered in the conventional truck tank. Although operating experience

Responsibility Toward Legislative Proposals

● Legislative interest in the petroleum tank truck is several fold, J. W. Sinclair, of Union Oil Co. of California, Los Angeles, pointed out in that section of his address on truck tank operating problems before the institute convention in Chicago which is not republished in the accompanying article.

As a motor vehicle, he pointed out, it is subject to the numerous requirements of national and state codes regarding highway usage, dimensional and load restrictions.

As a carrier of flammable liquids, it is subject to specific regulations as to fire hazards, embodying structure, usage and so on.

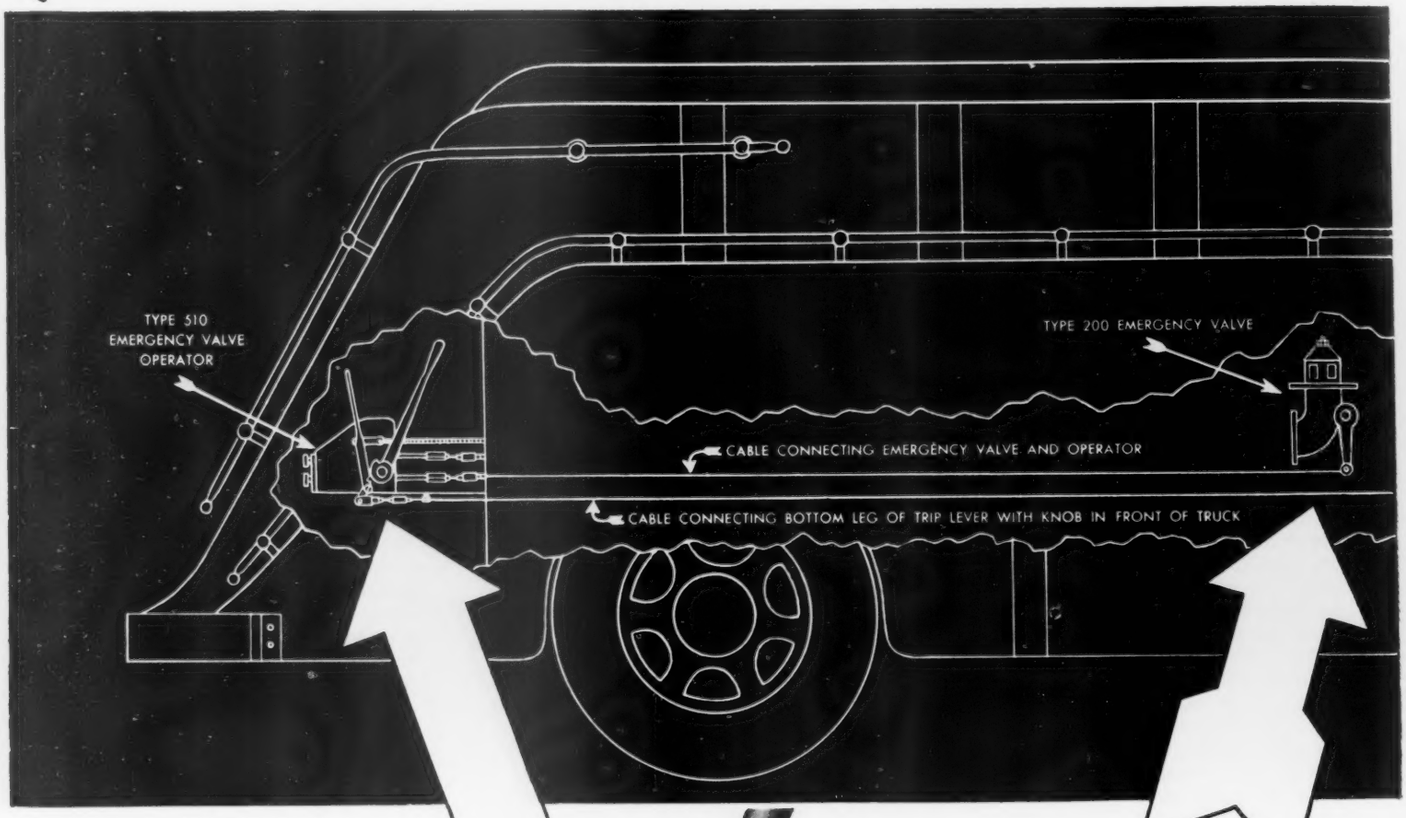
As a medium of calibration, the tank itself is subject to pertinent requirements of sealers of weights and measures.

"The character of the usage of the vehicle may subject it to regulations emanating from public utility commissions, state boards of equalization, industrial accident commissions and the Interstate Commerce Commission," it was stated. "State, county and local police officers take a hand in directing operations."

His conclusion was an urgent plea to all owners and operators to keep themselves informed on legislative and regulatory proposals, in order that the practical use of this type of motor vehicle may not be unfairly restricted.

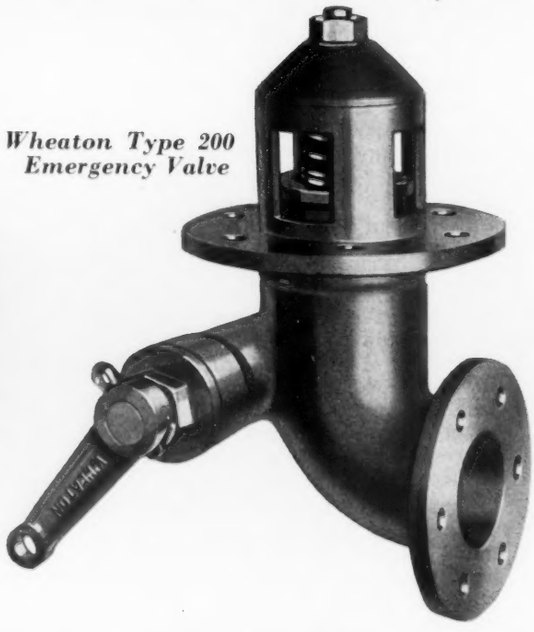
Wheaton Announces A NEW

Here is the last word in EMERGENCY VALVE OPERATORS with an improved EMERGENCY VALVE that prevents leaks


TYPE 510
EMERGENCY VALVE
OPERATOR
TYPE 200 EMERGENCY VALVE
CABLE CONNECTING EMERGENCY VALVE AND OPERATOR
CABLE CONNECTING BOTTOM LEG OF TRIP LEVER WITH KNOB IN FRONT OF TRUCK

Wheaton Type 510 Emergency Valve Operator

Wheaton Type 200 Emergency Valve



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EMERGENCY VALVE OPERATOR

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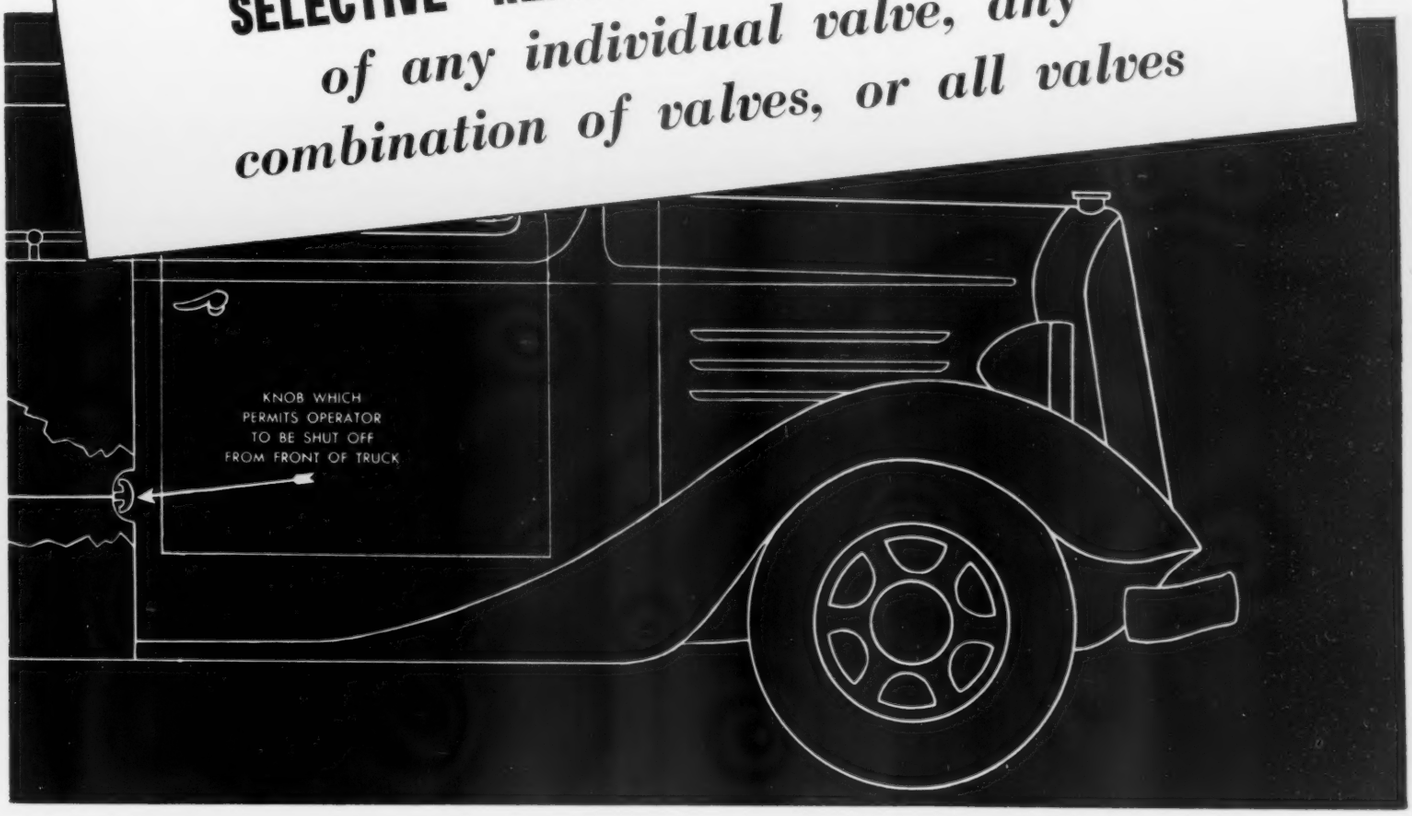
SELECTIVE REMOTE CONTROL OPERATION

of any individual valve, any combination of valves, or all valves



● This new Wheaton Type 510 Emergency Valve Operator marks one of the greatest advances ever made in truck tank operation. It is a small, compact, self-contained unit. A set of knobs (connected by selector shafts and cables to the emergency valves) gives selective remote control of any individual valve or combination of valves.

To select any valve, you just give the knob a quarter-turn. The valve is opened by simply pulling the operating lever; its latch lug locks in the latch of the trip lever.

The valves are closed by releasing the trip lever, or from the front of the truck by a knob which is connected by cable and loom to the bottom leg of the trip lever. In case of fire, a fusible link melts, releases the spring tension on the trip lever, and permits the valves to close automatically.

This new Wheaton Type 510 Emergency Valve Operator teams up with the famous Wheaton Type 200 Emergency Valve to give 100% truck tank efficiency. Type 200 has a new kind of stuffing box that prevents leaks. Wear is automatically absorbed by the tension of a spring between two sets of glands and packings.

Give your truck tanks top efficiency by equipping them with the new Wheaton Type 510 Emergency Valve Operator and Type 200 Emergency Valve. Send for samples today—with the Wheaton money-back guarantee of satisfaction.

A. W. WHEATON BRASS WORKS, NEWARK, N. J.

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William A. Knapp Co., 1626 Walnut St., Kansas City, Mo.
Earl F. Sayers, 1425 So. Michigan Ave., Chicago, Ill.

Goodall-Mechanical Products Corp.
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If they're **Wheaton** *they're safe*

FILLERS • NOZZLES • WRENCHES • FITTINGS

and accident tables are not available in a representative degree, the limited experience with these types of trucks tends so to indicate.

The styled tank invariably incorporates enclosed and lower compartments for the carrying of bucket and package goods. The average floor height of such compartments above the ground level is approximately 20 inches, as compared to an average height of 40 inches for the open and elevated type of conventional can racks. The lifting-strain hazard is thus greatly minimized.

The nature of the skirted substructure permits the convenient and ready placement of step wells, as compared to projecting step plates or brackets most commonly used in the older-type vehicle. The longitudinal catwalks along the side of the tank, when provided, furnish a much safer footing than that effected when the open-type can rack was in vogue. The design, as a whole, lends itself more readily to convenient and usable handrail locations. The top of the tank, by reason of using the tunnel-type continuous dome and the flatter and more elongated fill opening covers, occasions the provision of catwalks along the top of the tank, which furnish more continuous footage with a minimum of projecting obstacles.

The completed tank and skirted mounting structure, offering a greatly reduced number of projecting obstacles, lends itself more readily to cleaning on the exterior, and tends to avoid the accumulation of dirt and mud on catwalks, which in themselves contribute to the accident hazard. A review of a semi-annual period of a representative fleet of tank trucks, involving approximately 4,000,000 miles of travel, does not indicate a single personal injury which could be attributed to the styled truck.

The styled truck, however, has been subject to criticism because of contended decreased side and rear visibility, especially the latter. An analysis of this criticism indicates that inadequate rear visibility is by no means peculiar to the style of the truck as a whole, but is due to the type of the tank used, regardless of whether or not the tank is styled. A semi-rectangular type of tank mounted in the conventional manner will present as serious an obstacle to rear vision as a styled tank of similar shape. This applies to round and oval tanks.

If the bulk or height of the tank does not permit rear windows (or exaggerated peep holes) at each side of the cab or, more important, the driver's side, restricted vision accrues. Even though the tank design permits some degree of rear vision, the bulk or length of the tank definitely limits such vision to a comparatively restricted area, and blind spots are present in a pronounced degree.

Tanks styled to conform with the cab contour eliminate altogether the admittedly restricted rear vision already present on the conventional trucks, and in this respect can be criticized. This condition, however, is not peculiar to styled tank trucks, as it is also present in other types of vehicles, such as panel delivery units, and can be offset only by the use of adequate and properly-placed out-riding rear-view mirrors.

The thought is also advanced that the styled trucks, by reason of skirting of the understructure, considerably enhance the backing hazard because of decreased visibility. Undoubtedly the skirted vehicle is somewhat more susceptible to this type of accident. However, the distinct probability exists that the basic cause has not been properly identified. Insofar as visibility in backing is concerned, the projecting open-type can rack presents as effective an obstacle to clear vision to the rear as does the skirted portion of the styled truck, especially when the former is carrying a full complement of cans. However, the lower skirting of the styled truck will foul objects which the elevated can racks will clear. Considering the fact that objects cannot be seen by the driver of either the styled or conventional truck, the basic cause is lessened clearance rather than decreased visibility.

A review of the semi-annual period of operation for the fleet hereinbefore mentioned reveals interesting, but not necessarily conclusive, information regarding the relative number of vehicles of the conventional and styled types involved in accidents resulting from obstructed vision to the rear. Practically all of these accidents occurred while the vehicle was in reverse.

This type of accident represents approximately 25 per cent of all accidents, an outstandingly high percentage. Yet, from the standpoint of severity, the amount of physical damage was negligible. In fact, in a number of cases mere contact was established; but, because of the rather rigid requirements of the fleet in question as to accident reporting, they were classified as accidents. In only one in-

T. W. Legatski (left) and R. R. Couch (right), both of Phillips Petroleum Co., collaborated on a paper entitled "Fuel Systems of 1937 Automobiles" for the annual American Petroleum Institute meeting. Paper was published in NATIONAL PETROLEUM NEWS, Nov. 10, p. 40

N.P.N. says this is an advertisement but we say it's national petroleum news

Ray Schiesswohl's station at 1st and Rood Ave., Grand Junction, Colo., is in an "off location." Before that Phillips 66 Shield was raised above its ramparts it averaged 3000 gallons a month. Now Phillips 66 Poly Gas pours through its pumps—10,700 gallons a month!

Discounts discounts
Ray Schiesswohl cuts 'em out entirely and sees his gallonage increase

WHEN a gasoline distributor can eliminate discounts and not lose one customer—actually see his gallonage increase—it's time to keep on his trail until he tells his secret of success.

The man is R. H. (Ray) Schiesswohl, motorcycle maniac, who can make a sales curve shoot skyward as steeply as a two-wheeled, hill-climbing gasburner. The place—Grand Junction, Colorado. And the secret—quality products powerfully merchandised . . . Phillips 66 products and policies!

Inside Dope

But, here, read first-hand the letter Ray recently wrote to the Phillips Petroleum Company:

"The writer has spent 12 years in the gasoline and oil business in the city of Grand Junction, Colorado, and handled one line of merchandise for over 9 years, this line was a well known line, highly accepted, and nationally advertised. Our gallonage prior to 1935 was what we thought at its peak, but in May, 1935, we changed over to your products and from the very first day our gallonage started to increase.

"Our station located at 1st and Rood Ave., was an average station of 3000 gallons per month, and with your merchandise this station sold 58,942 gallons in seven months, and in 1936 this station sold 128,426 gallons. It is located on an off location.

"Our station located at 6th and Colorado Street, was an average station of 5400 per month, this gallonage was done by a discount deal to the consumer thru the so-called Coop purchasing. Our price was always from two to three cents below other stations, but in June, 1935, we installed your merchandise and this station gave us a gallonage of 38,730 gallons for seven months, with all discounts withdrawn. This we think was a wonderful compliment to Phillips line, as we did not lose one of our discount consumers when we cut off the discount.

"Our Motor Oils and Greases have doubled its sales, and we also feel that the Motor Oil is the World's Finest Oil for the Motor, and it is a pleasure for me to write you this letter as I have had a peace of mind since making a deal with your company and I think it is one of the most human organizations of its kind as I have had dealings with other companies and know what I am saying." (Signed) R. H. Schiesswohl.

Is your business picking up fast enough?

A good way to find out about stepping ahead in sales and profits is to write to Phillips.

We're a "human organization" as Ray Schiesswohl has discovered. And when a fellow wants facts and figures, we want to hear from him.

If your territory is still open, we'll reply promptly, answering any questions you may put to us. Why delay! Write, wire, or phone:

PHILLIPS PETROLEUM CO.
Bartlesville, Oklahoma
Chicago Minneapolis Peoria
Indianapolis Des Moines
Omaha St. Louis
Kansas City Wichita Tulsa Amarillo

stance was a personal injury involved, and that extremely nominal.

Of backing accidents, 3.4 per cent of all vehicles under 15,000 lb. gross weight were involved; and 11.5 per cent of all vehicles over 15,000 lb. gross weight were involved. This indicates, as is already evident, that size and bulk are the predominating factors in accidents of this nature. Further segregation of such accidents reveals that, of vehicles exceeding 15,000 lb. gross weight, 20 per cent of the styled type were involved, and only 7 per cent of the conventional or open-type.

However, the value of such a comparison is considerably minimized by the fact that the majority of the heavier-styled vehicles operate in metropolitan areas where the parking and maneuvering hazard is relatively high, whereas the open-type vehicles of large capacity have been preponderantly relegated to outlying areas.

When vehicles are not considered with respect to size, and are segregated only with respect to whether they are styled or conventional, approximately the same ratio of increase is noted for the styled vehicles. Of the conventional type, 4.4 per cent were involved in accidents of this character, as compared with 18.1 per cent for the styled vehicles. However, the same modifying factors as mentioned in the preceding paragraph apply.

A by-product of this analysis of backing accidents has to do with open- and closed-type cabs. The thought has been advanced that the closed-type cab is much more conducive to backing accidents. The experience of the fleet in question indicates no marked difference, as approximately the same ratio of accidents occurred for each cab type.

A review of all accidents of every nature produced no evidence conclusively, or even partially, that the streamline job contributes to highway hazard.

It must be appreciated that the foregoing comments as to backing and highway hazards, with relation to the styled unit, are based upon a comparatively short period for one fleet only. We do not know whether more comprehensive data as to time period or fleet coverage would differ therefrom materially.

Style Problems Summarized

The operating status of the styled tank, thus far presented, has not been over-complimentary. Although a number of the expected disadvantages have not been fully realized, styling has increased initial cost and deadweight, and has contributed to increased maintenance cost.

Are we, therefore, to assume that were the ultimate choice left to the operating personnel exclusively, the styled unit would be abandoned? We think not. Nor do we believe that operating men as a whole feel that style has contributed nothing to the advance of the truck tank. This contribution is difficult of analysis, however. It may be best likened to a challenge to mechanical ingenuity, or as furnishing that periodic prod so necessary to stimulate the inventive mind and the mechanical craftsman to greater activity.

In other words, the opening comments of this paper, stating that problems are merely an incentive to advancement, are being amply borne out with relation to styling problems.

Undoubtedly streamlining has not only accelerated the trend toward better appearance in accessory equipment but, having focused attention on these units, has resulted in improvements in design effecting greater efficiency. Improved vents, dome covers, meter assemblies, faucets, piping layouts, etc., are examples of progress directly attributable to the stimulus of style. It is conceivable that this stimulus will continue in a degree sufficient to offset, in a measurable sense, the objectionable features outlined.

Operating men, as a rule, are not entirely unaware of the styled tank's advertising value. Other units in the industry's distribution system, heretofore considered outside the pale of beauty, have improved in appearance. The truck tank, a component part of this system, should not remain an ugly duckling. As a transportation unit, it is surrounded by vehicles, both trucks and cars, of streamlined design. Occupational pride will not permit the tank truck to revert to the status of a transportation tramp. We may safely assume that styling, in a more or less intensified degree, will be with us for some time.

Store Your Bulk Liquids with Absolute Safety

Your bulk liquids are safe when stored in any of the five strategically located General American terminals. Each drop is carefully protected. Separate pumps and lines are used for dissimilar commodities.

These terminals are manned by a carefully trained personnel. General American safeguards your products with every precaution offered by modern equipment and experienced handling.

GENERAL AMERICAN
TANK STORAGE TERMINALS

Can Handle Anything That Will Flow Through a Pipe Line

TERMINALS
Goodhope, La., Westwego, La.
Corpus Christi & Houston, Tex.
Carteret, N. J.

GATX GENERAL AMERICAN

OFFICE
135 South LaSalle Street
Chicago

A division of General American Transportation Corporation

New Patents

Compiled by R. E. Burnham, patent and trademark attorney, 511 Eleventh Street, N. W., Washington, D. C., from whom copies may be obtained at the rate of 25c each. State number of patent and name of inventor when ordering.

September 7, 1937

REFINING

Apparatus for controlling chemical reactions—Thomas B. Prickett, Woodbury, N. J., assignor to Houdry Process Corp. Filed Feb. 1, 1935. No. 2,092,017.

Solvent fractionation of hydrocarbon oils—Maurice H. Arveson, Hammond, Ind., assignor to Standard Oil Co. (Ind.) Filed June 28, 1934. No. 2,092,199.

Treatment of acids sludge products—William H. Bahlke, Hammond, Ind., assignor to Standard Oil Co. (Ind.). Filed June 30, 1932. No. 2,092,200.

Apparatus for re-refining used oil—John H. Vital, New Orleans, La. Filed March 20, 1936. No. 2,092,436.

Method of and apparatus for distilling petroleum mixtures—George B. Coubrough, Long Beach, Calif., assignor to Lummus Co. Filed July 28, 1927. No. 2,092,528.

MISCELLANEOUS

Production of synthetic resins and resinous materials—Adrianus J. Van Peski and Johan F. M. Caudri, Amsterdam, Netherlands, assignors to Shell Development Co. Filed Dec. 18, 1935. No. 2,092,295.

Process for production of organic peroxides—Franz R. Moser, Amsterdam, Netherlands, assignor to Shell Development Co. Filed March 18, 1935. No. 2,092,322.

* * *

September 14, 1937

REFINING

Hydrocarbon oil treatment—Edwin R. Birkhimer, Philadelphia, Pa., assignor to Atlantic Refining Co. Filed March 28, 1933. No. 2,092,748.

Processes for treatment of hydrocarbon oil—Percival C. Keith, Jr., Peapack, N. J., assignor to Gasoline Products Co. Filed Oct. 5 and Nov. 16, 1933. Nos. 2,093,278 and 2,093,279.

Process for refining minerals, vegetable, or animal oils, paraffins, waxes, resins, and like—Johannes B. Carpzow, Bornsen, Germany. Filed Dec. 30, 1935. No. 2,093,348.

MISCELLANEOUS

Process for manufacture of ketones—Clayton M. Beamer, Elizabeth, N. J., assignor to Standard Alcohol Co. Filed July 15, 1935. No. 2,092,870.

Spring seal for floating roofs—Charles H. Haupt, Elizabeth, and Earle W. Hall, Westfield N. J., assignors to Standard Oil Development Co. Filed July 29, 1932. No. 2,092,877.

Process for producing improved detergents—Hans G. Vesterdal, Elizabeth, N. J., assignor to Standard Oil Development Co. Filed Dec. 30, 1933. No. 2,092,943.

Refining naphthenic acids—Arthur L. Blount, Palos Verdes Estates, Calif., assignor to Union Oil Co. Filed Nov. 25, 1935. No. 2,093,001.

Fuel for internal combustion engines—Alfred C. G. Egerton, Oxford, England. Filed June 20, 1935. No. 2,093,008.

ITS PERFORMANCE WILL ENDORSE IT
The cardinal reasons for the widespread acceptance of the Leland gasoline dispensing motor again appear in the success story of the Leland unloading and transfer motor. They are:
Soundness of design, reflecting 15 years of explosion-resisting motor experience and leadership.
Painstaking care in fabrication and inspection.
Adequate and prompt service . . . some 200 fully equipped Leland service stations ready for any emergency.
Obtain one of these Leland bulk station motors and place it in service. Its performance will endorse it.
THE LELAND ELECTRIC COMPANY
Canadian Address TORONTO
DAYTON, OHIO
Cable Address LELECT
LELAND

Without great expense the service station can decorate for the Holidays, thus keeping in step with any Holiday "dress up" program adopted by the neighborhood merchants, and providing a suitable background for the sale, at thestation of automotive merchandise as Holiday gifts. Above is a station of Socony-Vacuum Oil Co. Inc.

Christmas Holiday Trade For Service Stations

AT CHRISTMAS time last year newspaper headlines shouted the report that millions of dollars more were being spent for gifts and pleasures than in preceding years.

Anyone who tried to buy as much as a two-cent stamp anytime between Dec. 1st and 25th will have little trouble remembering the size of the post office rush last year.

More than one unhappy male trying to make his way to the jewelry section of a department store was forced to resort to ungentlemanly and ineffective line bucks.

Service stations came in for their normal share of this extra business in increased gasoline sales. City folks drove home to the country. College students trooped over the highways. Many extra miles were driven by Holiday shoppers.

Some service station operators who last year were content to accept only the share of extra business that fell their lot plan to work things out on a somewhat different basis this year.

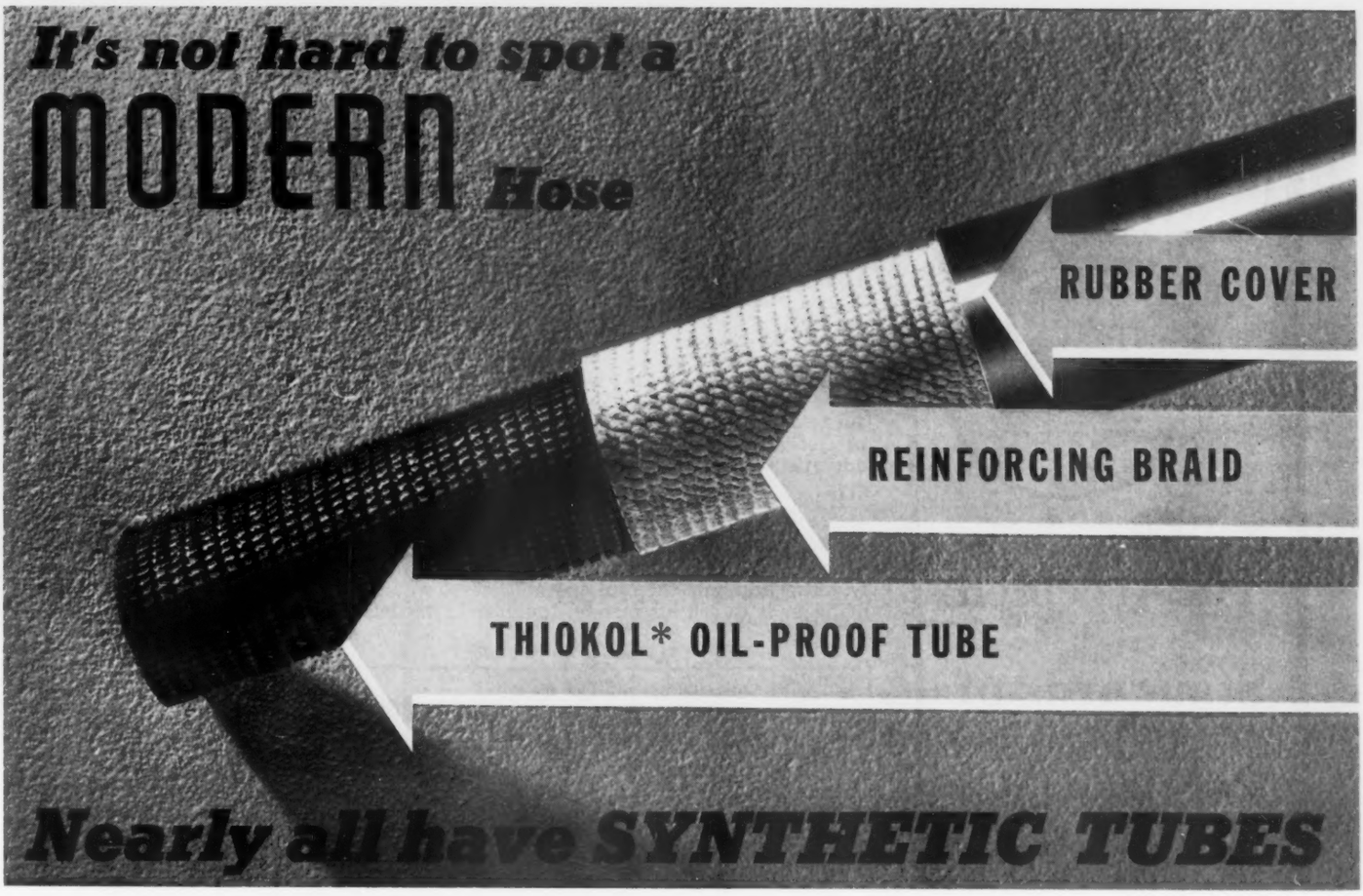
They have seen neighborhood merchants move large quantities of goods suitable for gifts. Drug, hardware and dry goods stores handle toys, jewelry, incidental furniture and many more other non drug, hardware or dry goods items. These progressive operators see no reason why they, too, shouldn't deck out their stations so as to appeal to the Christmas trade. They have said to themselves, "Good old St. Nick. Let the cash register bells ring out too."

A word should be said on the matter of handling non-automotive merchandise. In an experiment last Christmas one dealer found that, although stores all around him were selling Christmas candles, he was barely able to get his cost out of a supply that he put in at his own service station.

In spite of the fact that the candles sold in drug and dry goods stores were probably made by his own supplying company, this service station man found his customers slow to accept this non-automotive line from him. It is suggested that care be used in selecting merchandise other than that usually found in service stations, or which is not logically connected in a

Suggested Holiday Merchandise For Stations To Sell

Item	Estimated Wholesale Cost	Item	Estimated Wholesale Cost
Lamp Bulb Kits	$0.45	Auto Thermometers	$0.15
Driving Light	2.35	Steering Knobs	.18
Winter Fronts	.45	Marker Lights	.16
Polishing Cloths	.20	Fender Guards	.27
Flashlights	.30	Strong Boxes	.25
Flashlight Holders	.15	Gear Shift Knobs	.17
Goggles	.55	Seat Covers	1.25
Lock Gas Caps	.75	Rear View Mirrors	.34
Exhaust Extensions	1.00	Grille Guards	1.00
Radios	13.00 up	Defroster Fans	2.40
Radio Antennae	1.50	Heaters	5.00 up
Ash Trays	.15	Defroster Attachments	1.80
Tool Kits	.75	Horns	2.00 up
Auto Compasses	1.50	Driving Gloves	1.00
Fender Guides	.25	Cigar Lighters	.15 up
Lap Robes	2.00 up	Garage Extension Lights	.25



All along the line, the people who make hose are adopting synthetic tubes for newest models. They've taken this step because their engineers found a synthetic tube hose saves work, time, and money.

To give you hose at its best, many brands are constructed with tubes made of "THIOKOL"*— America's first and finest oil-proof synthetic rubber. "THIOKOL" synthetic rubber makes a tube that is flake-proof and gasoline-proof at all temperatures. It gives hose a flow that even veteran oil men say is absolutely tops. And do these remarkably light and flexible models cut down back-bending labor! If you're thinking of buying *any* type of oil hose, it will pay you to check up on brands having the "THIOKOL" synthetic rubber tube. They last longer, lighten your job, cost no more.

For the name of the manufacturer or jobber nearest you, write Thiokol Corporation, Yardville, N. J.

*Reg. U. S. Pat. Off.

OIL-PROOF **THIOKOL** SYNTHETIC RUBBER

OPERATOR OF SERVICE STATION CHAIN SAYS:

" . . . And we don't care whether they have blended benzol in the gasoline or not because I know that hose made with 'THIOKOL' synthetic rubber tubes will even stand 100% straight benzol."

USED ON CARS FOR YEARS . . . . . .

Feature on half dozen 1938 cars is the oil-proof, flexible filler neck hose made of "THIOKOL" synthetic rubber. This material has been used by automotive engineers for years to overcome oil and gas line problems.

The Accepted Standards of Pennsylvania Bright Stock Excellence Since 1900

H-M and L-M Oils Are Made Solely By

THE CONEWANGO REFINING CO.

Warren, Pa.

customer's mind with automotive items.

The above suggestion should not dampen the spirits of Holiday Season minded station merchants. There are many automotive items that adapt themselves wonderfully as gifts. The list is longer this year than ever before. Accompanying this article is a list, with wholesale prices estimated, that might be used as a guide in considering Holiday merchandise to handle at a service station.

Driveway sales plans for Holiday merchandise should be built around three general factors used by successful retailers. They are proper training of clerks, display of merchandise and advertising.

It is difficult for service station helpers to sell merchandise in which they are not thoroughly sold themselves or which they do not understand completely. The first job, then, of the station manager is to sell his men on the idea of pushing Holiday merchandise as gifts.

Because the plan of selling station merchandise as gifts is not widely used the manager may encounter his first stumbling block at this point. He can, however, point out the fact to his helpers that they themselves would be pleased to receive such gifts, instead of the usual collection of socks and handkerchiefs that generally swamp males at Christmas. Most drivers would prefer an article of use for the car to a box of dried up stogies left over from the November elections stock.

It is also advisable that the station manager carefully explain to his men the need, the use and the method of installing some of the Holiday items. No man wants to sell an article that might boomerang, showing him up as a monkey when he starts to install it. Conversely and as an illustration, a man would be anxious to sell an electric defroster if he knew that he could install it smoothly and efficiently. It would afford a chance to display his prowess.

Good displays are more of a problem in service stations than in other retail stores because comparatively few customers enter the building and sun, rain, wind and dust are real obstacles to outside displays. Island stores can be used to advantage if attractively arranged and well lighted but they do not answer the whole problem. People will buy more readily if they are able to handle and examine articles which strike their fancy.

Dime stores and department stores have found that merchandise islands attract customers and encourage buying. By the use of tables or bins and smaller stands they can build up huge piles of merchandise, pyramid style, from the floor to a height of five or six feet in some cases. To duplicate these displays in a service station would not be practical, but smaller models can easily be made that answer the purpose quite well.

Any small table can be equipped with castors or wheels so that it can be rolled out of the station in fair weather. Large articles can be wired to the table top making it unnecessary that they be removed while moving the table from one location to another. Small wooden stands, decreasing in size, can be built. Placed atop one another and the whole placed on the table the pyramid effect is gained. When moving the display it is not necessary that each individual item be handled. With a little care each section can be carried without disturbing the merchandise.

The advantage of such a display lies in the fact it can be placed outside, in full view of the driveway customers, and yet moved quickly into the station in case of a sudden storm.

If the articles displayed are put back in stock at the slightest sign of becoming faded or soiled and fresh items are substituted, the display can be

Auto Accessories Are "Desired" Items Again

We "old birds" who have driven cars for 20 or 25 years can recall when an automobile owner would take more pride in showing you some new "gadget" accessory he had bought for his car than anything else he owned except the car itself.

Then the automobile manufacturers took to putting on the car themselves about all the accessories a normally sane driver would need and there wasn't a lot left in the way of automotive gewgaws that a man had much desire to buy.

Within the past few years, however, have come a flood of automotive luxuries, rather than necessities, many of them electrically operated, of such attractive nature that a man's money burns holes in his pocket when he looks at them.

Most of them are not expensive and they are easy to instal. They would make fine Christmas presents for any man, or almost any car owner for that matter, much better than the time honored tie or box of cigars. Service stations which now carry well selected lines of automotive merchandise could well consider pushing selected items as Holiday gifts.

Later issues of National Petroleum News will carry more on this subject and on the effective decorating of service stations for the Holidays.

THE QUALITY GOES UP AND UP

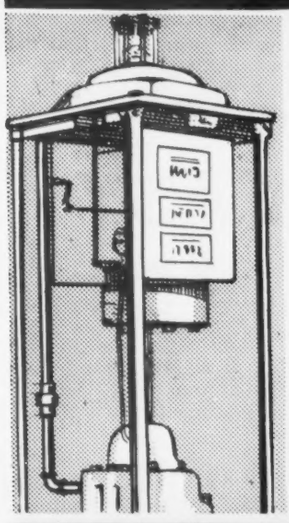
We've always kept one step ahead in our methods of blending and refining automotive and industrial lubricants. Jobbers have to have top-notch quality for their own brands. That's the way they hold their customers. And that's the way we hold them. Wire for samples and prices!

AMERICAN LUBRICANTS
INCORPORATED
1575 CLINTON STREET
BUFFALO • NEW YORK
perfected lubrication

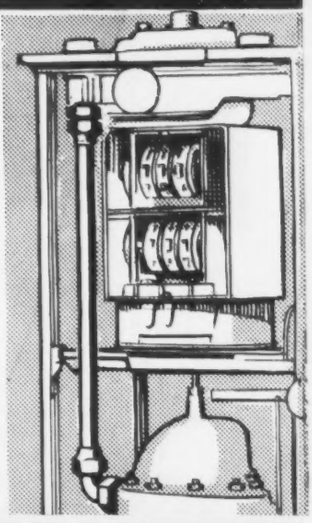
8 LEAK POINTS ELIMINATED

4 NIPPLES
1 GROUND JOINT UNION • 2 ELLS

1 PIECE OF COPPER PIPE AND 2 *Double Seals*



WHEN you see copper pipe and Hays Double Seals in your new gasoline pumps, you know that a keen designing engineer has decided to eliminate leaks. Only Hays Double Seals have the 2 planes of contact (45° plus 90°) on the copper pipe and the fitting—which come together under compression to make a joint of great mechanical strength.
Double Seals and copper pipe below the ground from tank to pump cut out many fittings and swivel joints. Copper pipe will bend with ground pressure and jarring vibration of big trucks will never budge a Double Seal Connection. Use Double Seals for strong permanent piping.
Write for 24 page catalog.



HAYS MFG. COMPANY, ERIE, PA.

A gasoline is needed

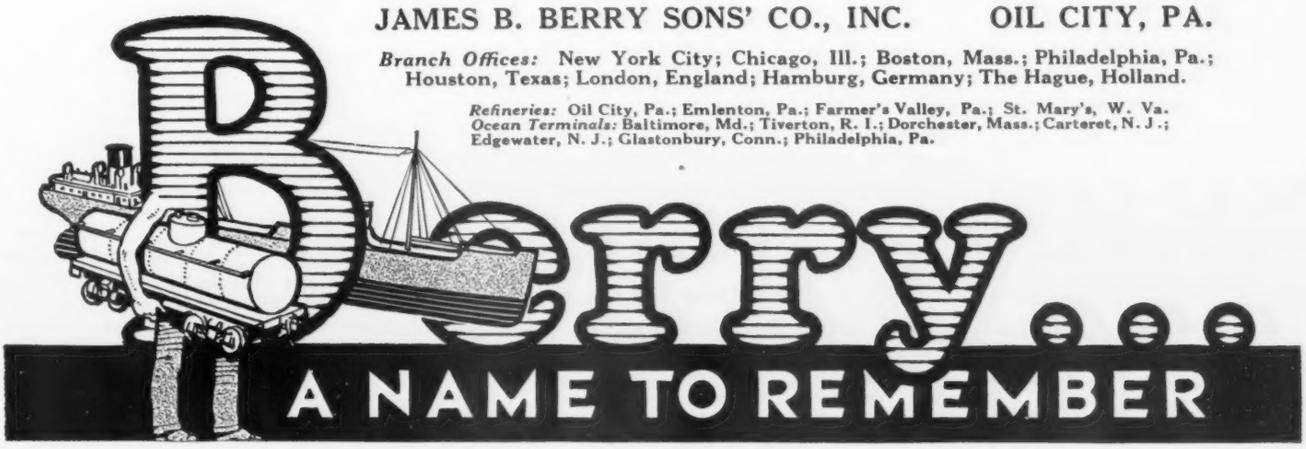
that has the necessary quality of "a quick start". All gasolines supplied by "BERRY'S" from their Terminals and Refineries are so processed that instant starting is assured, as well as maximum mileage and Octane rating.

We are in position to furnish Fuel and Furnace Oils for immediate shipment. Your inquiries on Petroleum products of any kind are earnestly solicited.

JAMES B. BERRY SONS' CO., INC. OIL CITY, PA.

Branch Offices: New York City; Chicago, Ill.; Boston, Mass.; Philadelphia, Pa.; Houston, Texas; London, England; Hamburg, Germany; The Hague, Holland.

Refineries: Oil City, Pa.; Emlenton, Pa.; Farmer's Valley, Pa.; St. Mary's, W. Va.
Ocean Terminals: Baltimore, Md.; Tiverton, R. I.; Dorchester, Mass.; Carteret, N. J.; Edgewater, N. J.; Glastonbury, Conn.; Philadelphia, Pa.



maintained attractively without loss of stock due to the effects of weather. One display of the type mentioned was maintained throughout the summer months with negligible loss due to spoilage or theft.

The actual arrangement of a Christmas display must of necessity be left to the ingenuity of the station man. A suggestion would be that a small, lighted tree be placed at the top and the merchandise, some wrapped as gifts, be grouped around the tree as artistically as possible. Those unfortunate station men who have not been blessed with an artistic sense, whose fingers are all thumbs when it comes to wrapping packages, can enlist the help of a neighboring merchant who is more accustomed to that work. Wives can often be pressed into service in giving "balance" to the display.

Mental objections on the part of customers can be overcome to a considerable degree if the displayed gifts are plainly priced. It is just human nature to object to "tipping one's hand" and inviting a sales talk by asking the price of anything.

Inasmuch as an island display table can be used for many months its cost of construction should not be considered as a direct expense for this particular season; but rather as an investment to be written off over a period of months by the profit realised on extra sales.

Advertising plays an important part in many retail sales campaigns. The amount of money invested by a service station operator in a Christmas sales push would be determined by the amount available, past experiences and the judgment of the operator as to the amount needed to accomplish his objective.

There is no doubt but that signs and placards placed at advantageous spots around the station would add much weight to personal sales pressure and the value of window or island displays.

Many station men use postcards regularly to a select group of customers. It is quite possible that an announcement of the Holiday season items on such a mailing would prove of value.

Newspaper advertising is generally out of reach of operators in the larger cities but a well planned sales campaign would probably warrant a moderate investment in locations where neighborhood or suburban papers are available. Many city operators have found dodgers to be effective.

Naturally there can be no set rules governing the amount of effort or money expended on a Holiday season sales plan. It should be remembered, though, that the three sales factors, personal selling, display and advertising make a good team and that, while each is important in its own right, they tend to strengthen each other when used together.

EASY TO HANDLE!

That's ONE Reason Why Your Drivers Will Make More Deliveries With . . .

GOODALL

"NEWTYPE CORD"

U. S. PAT. NO. 1,948,410

SYNPLASTIC Fuel Oil Hose

Quicker deliveries, more stops per day, and more gallons delivered per truck, are the inevitable results of using this dependable, long-life Fuel Oil Hose. It is not only light in weight and extremely flexible, but kink-free and non-flattening . . . features that insure a full flow, *always*, even when hose is partially reeled. *Drivers like it* because it's so easily handled!

Made in sizes from 1" to 1½" I. D. in lengths up to 150 feet; and in larger sizes in lengths up to 50 feet.

CURB PUMP HOSE **GASOLINE TRUCK UNLOADING HOSE**

GOODALL RUBBER CO.

5 South 36th Street Philadelphia, Pa.

NEW YORK - PITTSBURGH - CHICAGO - CLEVELAND - HOUSTON

GOODALL MECHANICAL CORP.

SAN FRANCISCO - LOS ANGELES - SEATTLE

FACTORY: TRENTON, N. J.

Why The Farmer Buys At Wholesale Prices

The anomaly of the retail marketing practice in the oil industry where gasoline is sold to the farmer, from the tank wagon, at less than the price at the service stations, where no delivery is involved, is explained in a booklet issued by the Standard Oil Co. of Indiana, entitled, "Oil Comes to the Farm." The text discusses the wide benefits that have come to farmers through developments and progress in the oil industry and the Standard of Indiana's part in this development.

"For the beginning of the close relationship which exists between Standard of Indiana and the farmers of the middle west, one must look back to the turn of the century," reads the booklet. "Horse drawn tank wagons were then carrying kerosine and a few other petroleum products from centrally located bulk plants to grocery stores and other retail outlets in scattered towns.

"As the use of oil consuming devices increased, farmers here and there began buying off passing wagons, and in time the demand for this service was such that Standard tank wagons were driving into nearly every farmyard in ten states.

"None was too remote from the bulk plant to receive this *free* service, and no day was too cold, too hot, or too wet to prevent deliveries, if they were needed. Aside from the rural delivery of mail by the government, there has been no more impressive example of free delivery service than Standard's farm trade by tank wagon over a period of thirty-seven years."

"Because of the considerable quantities of his purchases, the farmer demanded and obtained discounts which enabled him to buy in quantity at *wholesale prices.*

"For more than a third of a century Standard has recognized in a very practical and convincing way the principle that the farmer is a producer, a manufacturer, and should consequently purchase the raw materials and supplies needed in large quantities in his producing operations at wholesale instead of retail prices. Literally millions of dollars have been saved by farmers on their purchases of petroleum products as the result of Standard's origination and maintenance of that selling policy."

The booklet also points out that the policy of the Indiana Standard in licensing to other refiners the Burton cracking process made possible gasoline at low prices, which furthered the use of motor vehicles on the farm and elsewhere.

Major Petroleum Co. Changes

PHILADELPHIA, Nov. 15.—The Major Petroleum Co., one of the largest independent retail distributors of gasoline in Philadelphia, has started to handle a major company branded gasoline—Essolene—at its stations in addition to its own private brand.

Essolene is the regular "Q" grade gasoline retailed by Standard Oil Co. of Pennsylvania, one of the Esso Marketers group. In addition, Major will sell "Esso," Standard's Ethyl grade, at some stations. The change will affect approximately 36 stations, Major Petroleum stated.

The Major Petroleum Co. have been retail distributors in Philadelphia for 14 years, handling its own private brand of gasoline. In addition, for the past four years it has sold "Spartan" brand gasoline at some of its stations. The latter brand of gasoline is sold by Standard of Pennsylvania and others of the Jersey Standard group to their distributors but has not been advertised to the general public.

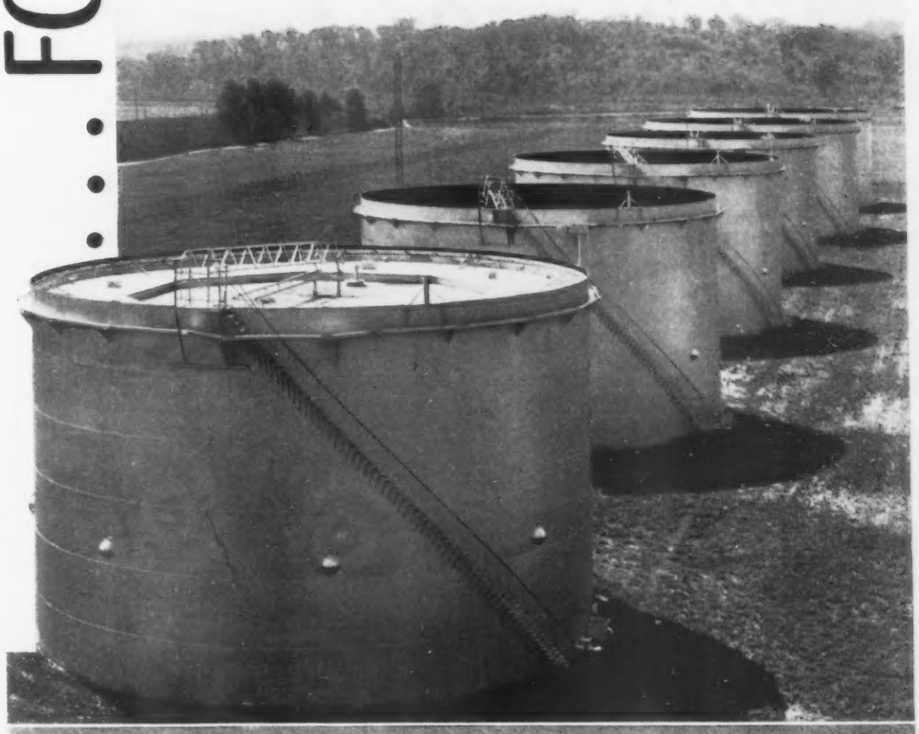
Must Pay "Entrance Fee"

WASHINGTON, Nov. 8.—U. S. Supreme Court today upheld a decision of the Virginia supreme court holding that Atlantic Refining Co. must pay the maximum state "entrance fee" of $5000, based on its total capitalization of $100,000,000, in order to engage in business in Virginia.

Illinois Output Doubles

SPRINGFIELD, Ill., Nov. 5.—New pools in Illinois may yield more than 100,000,000 barrels, it is disclosed by John Hallihan, state director of registration and education. Oil production had doubled in the six months ended Sept. 30, 1937, it was shown in a report written by Dr. M. M. Leighton, chief of the state geological survey. Estimated output for September was 818,000 barrels as compared with 410,000 in March and less in earlier months.

...FOR WORKING TANKS



WIGGINS PONTOON ROOFS

THE tanks shown above are part of an installation made recently at the Kansas City, Kan., terminal of the White Eagle pipe line (Socony Vacuum Oil Co., Inc.) They are equipped with Wiggins Pontoon Roofs of the latest type and are used to handle gasoline brought in by the pipe line.

The Wiggins Pontoon Roof is especially designed for service on working tanks. As the name implies, this roof is not attached to the top of the tank shell but floats directly on the surface of the liquid. The pontoon deck is made slightly smaller than the tank shell and is equipped with a special seal which closes the annular space between deck and shell. The buoyant pontoon construction, the principle of the Wiggins seal, the drainage system, and all other details of construction are features that have been thoroughly proved in service.

Wiggins Pontoon Roof tanks are highly efficient in stopping evaporation loss from any oil that does not boil at ordinary atmospheric temperatures. Both breathing and pumping losses are eliminated because there is no space above oil for an air-vapor mixture to accumulate. This same feature contributes a resistance to fire hazard which is recognized and approved by the Underwriters' Laboratories.

For complete information, address our nearest office. Quotations on request.

Chicago Bridge & Iron Company

Cleveland	2206 Rockefeller Bldg.	Dallas	1439 Liberty Bank Bldg.
Chicago	2125 Old Colony Bldg.	Birmingham	1534 N. Fiftieth Street
New York	3345—165 Broadway Bldg.	Houston	2919 Main Street
Philadelphia	1611—1700 Walnut Street Bldg.	Tulsa	1607 Hunt Bldg.
Boston	1516 Consolidated Gas Bldg.	San Francisco	1060 Rialto Bldg.
Detroit	1513 Lafayette Bldg.	Los Angeles	1422 Wm. Fox Bldg.

FABRICATING PLANTS in Birmingham, Chicago, and Greenville, Pa.

FREEDOM offers 4 "Big Name" Oils

Fort Pitt, Beaver-Penn, Four-State and Penn Trump Motor Oils stand right at the top among the aristocrats. As 100% Pure Pennsylvania Grade Oils, they have built fine reputations for scores of jobbers and they have turned in some excellent profits. Your territory may be open for exclusive sales rights. Write today for information.

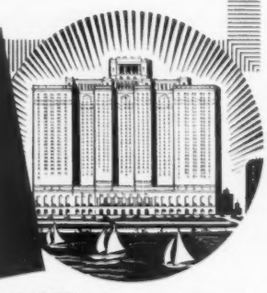
REFINED FROM 100% PURE PENNSYLVANIA GRADE CRUDE

These oils are sealed at the refinery in attractively lithographed cans. They are also available in bulk or they can be packed in jobber's own private brand cans.

THE FREEDOM OIL WORKS COMPANY
FREEDOM, PENNSYLVANIA

MANY FINE PEOPLE HAVE PRAISED

the world of ease and comfort—the genial atmosphere of the world's largest hotel. When you come to The Stevens, you'll find their stories true. This good will is the result of the constant effort of our entire staff to make the most discerning traveler feel at home.



STEVENS
"America's Grand Hotel"
CHICAGO

OTTO K. EITEL, *Managing Director*

NEW EQUIPMENT and the manufacturer

Burner-Boiler Unit

Fluid Heat Division of Anchor Post Fence Co. announce a new burner-boiler unit known as Series "A." The boiler is a cast iron sectional type available in six sizes to handle from 355 to 755 square feet of standing steam or 570 to 1205 square feet of standing hot water.

* * *

Tank Car Blower

The Coppus tank car blower is an addition to specialties in portable ventilators marketed by Coppus Engineering Corp., Worcester, Mass. Designed for attachment to the nipple at the bottom of the tank car, the unit is said to deliver 600 cubic feet of air per minute. The blower employs a ¼-h.p. totally enclosed motor. Weight is 55 pounds.

* * *

Gear Flush Solvent

Circo Products Co., 3088 W. 106th St., Cleveland, is announcing its new Dee-Tee solvent vapor cleaner for flushing gears. The solvent, a stabilized chlorinated hydrocarbon known as Dee Solv, is non-inflammable and is said to leave gears absolutely dry. The solvent is vaporized by electric heat and can be reclaimed in a still also manufactured by the company.

* * *

New and larger quarters for the eastern sales office of Electric Hose & Rubber Co., Wilmington, Del., are announced at Rockefeller Plaza, New York.

* * *

Appointment of K. M. Schaefer as assistant to the general manager, assigned to sales, has been announced by R. W. Ruddon, vice president and general manager of Federal Motor Truck Co., Detroit.

Bunker Fuel Oil Prices Revised At Many Ports

NEW YORK, Nov. 12.—Ships' bunker prices for Bunker C fuel and diesel oils were revised at many foreign ports on Nov. 1, Standard of New Jersey stated this week.

Following are new Bunker C prices: Prince Rupert, B. C., $1.50; Vancouver, B. C., $1.35; Victoria, B. C., $1.40; Tampico and Vera Cruz, Mexico, $1.00; Balboa and Cristobal, Canal Zone, $1.20; Caripito, Venezuela, $0.98; Cienfuegos, Cuba, $1.65; Havana, Cuba, $1.65; Kingston, Jamaica, $1.20; Neuvitas, Cuba, $1.65; St. Thomas, Virgin Islands and San Juan, Porto Rico, $1.20.

New diesel oil prices: North Vancouver, B. C., $1.95; Victoria, B. C., $2.00; Balboa and Cristobal, Canal Zone, $2.00; Aruba, N.W.I., $1.80; Bermuda, $3.00; Curacao, N.W.I., $1.80; Kingston, Jamaica, $2.00; St. Thomas, Virgin Islands, $2.00; and Trinidad, B.W.I., $1.80.

Socony Building $200,000 Warehouse

CLEVELAND, Nov. 22.—The Cleveland division of the Socony-Vacuum Oil Co., Inc., is building a $200,000 compounding plant and warehouse, which will adjoin its present buildings in Cleveland's industrial flats. The two-story brick building is scheduled to be completed in February.

Fifty-four additional tanks will be installed, permitting a larger inventory of raw material oils and a greater stock of finished cutting oils, soluble oils, bearing oils, gear oils and other industrial lubricants. The tanks will be housed in a fire-proofed tank room. The tanks will increase storage by half a million gallons and can be used also for blending.

Other Equipment

An insulated cold room, four feet underground, will be used to store candles. Manufacturing and other equipment will include two new mixing kettles, automatic canning equipment with a capacity of 50 gallons per minute, and barrel machinery capable of cleaning and repainting 50 barrels an hour. A new laboratory will be built, a new loading rack will have a capacity of eight incoming and outgoing trucks at a time.

California Oil Law

LOS ANGELES, Nov. 13.—Sponsored by the Better Business Bureau, three discussions of the California Oil and Gasoline Substitution act were broadcast over the radio in California last week.

Outlining the manner in which this law protects the public from fraud and deception when buying motor fuel and lubricating oil, these educational talks were given Nov. 8, over KFWB; Nov. 11, over KNX; and Nov. 13, over the 22 stations of the Don Lee Network.

Taxes Yield Higher Returns

WASHINGTON, Nov. 15.—Federal government coffers gained $26,382,744.50 in September from the four direct federal taxes on the petroleum industry, according to figures of the Bureau of Internal Revenue. September, 1936, collections were $22,472,972.61.

In September this year large gains were shown in collections of all but one of the taxes—processing of crude petroleum, which brought in $57,939.51, compared with $73,644.53 in the same month of 1936. This decrease is said to be due to delay in reporting, or some other mechanical factor in the collection machinery, rather than a decrease in runs to stills.

Collections of the other three taxes in September, 1936 and 1937, were:

	1936	1937
Gasoline	$18,949,475.86	$25,190,854.66
Lubricating oils	2,512,321.08	4,054,466.17
Transportation by pipeline	937,531.14	1,079,484.16

Buys Jobber Company

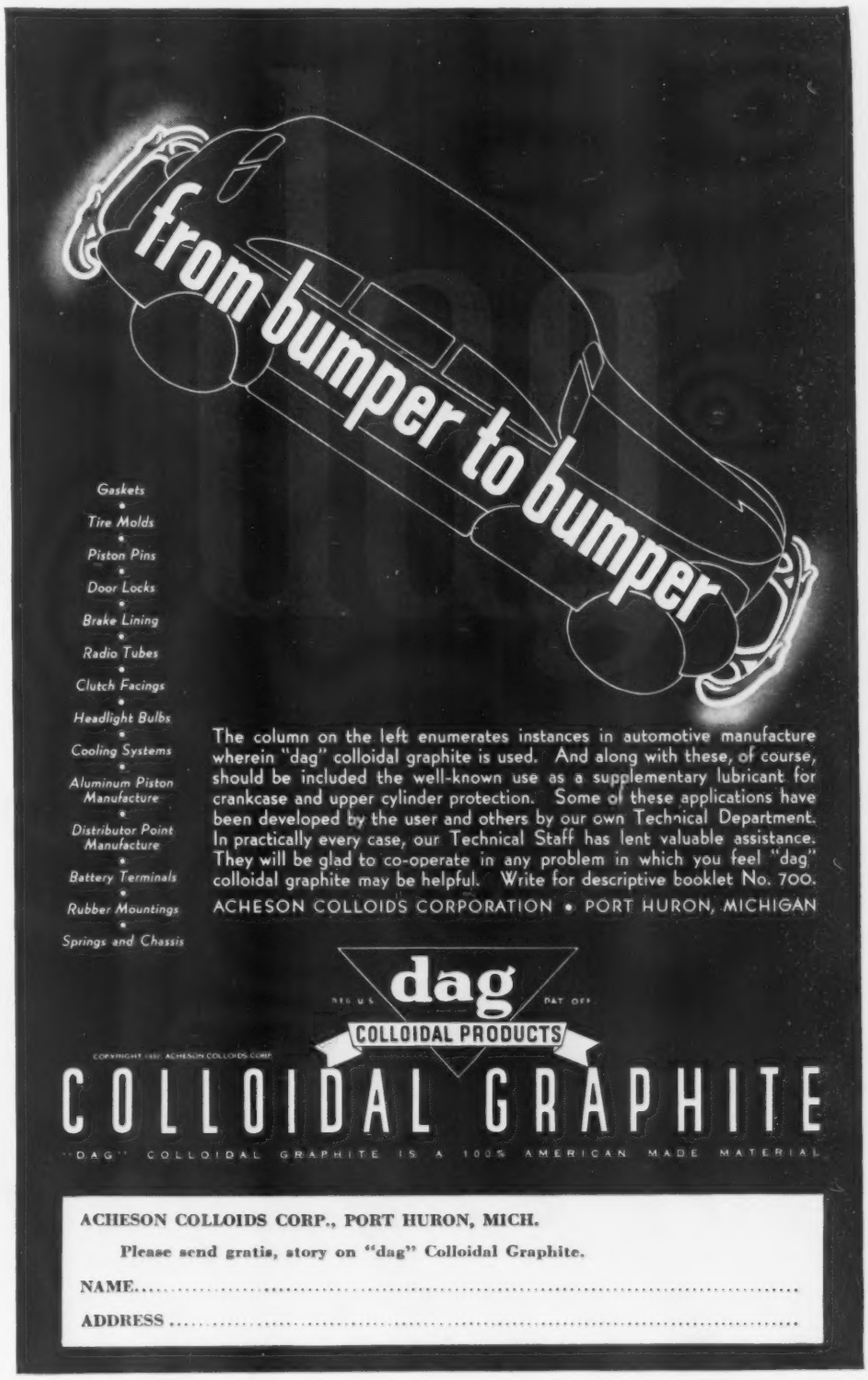
SOUTH HAVEN, Mich., Nov. 15.—A. D. Dubuisson, president of Wolverine Service Stations, South Haven, announces the purchase of the Fruit Belt Oil & Gas Co., Benton Harbor. Dubuisson's company also has been appointed Mobilgas distributor in Berrien county.

Wisconsin Petroleum Assn. to Meet

MILWAUKEE, Nov. 15.—Annual meeting of the Wisconsin Petroleum Assn. will be held Feb. 22, 23 and 24 at the Schroeder hotel, Milwaukee, Roy L. Brecke, association secretary, announced last week.

James S. Harrison, of Milwaukee, Harrison Oil Co., again will be chairman of the convention and the trade exhibit. Exhibit space reservations already about equal the total at the 1937 convention.

Brecke announced that a program of nationally prominent speakers is being arranged.


from bumper to bumper
Gaskets
Tire Molds
Piston Pins
Door Locks
Brake Lining
Radio Tubes
Clutch Facings
Headlight Bulbs
Cooling Systems
Aluminum Piston Manufacture
Distributor Point Manufacture
Battery Terminals
Rubber Mountings
Springs and Chassis
The column on the left enumerates instances in automotive manufacture wherein "dag" colloidal graphite is used. And along with these, of course, should be included the well-known use as a supplementary lubricant for crankcase and upper cylinder protection. Some of these applications have been developed by the user and others by our own Technical Department. In practically every case, our Technical Staff has lent valuable assistance. They will be glad to co-operate in any problem in which you feel "dag" colloidal graphite may be helpful. Write for descriptive booklet No. 700.
ACHESON COLLOIDS CORPORATION • PORT HURON, MICHIGAN
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COLLOIDAL PRODUCTS
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"DAG" COLLOIDAL GRAPHITE IS A 100% AMERICAN MADE MATERIAL
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Please send gratis, story on "dag" Colloidal Graphite.
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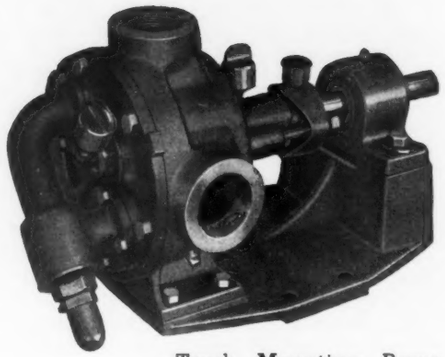
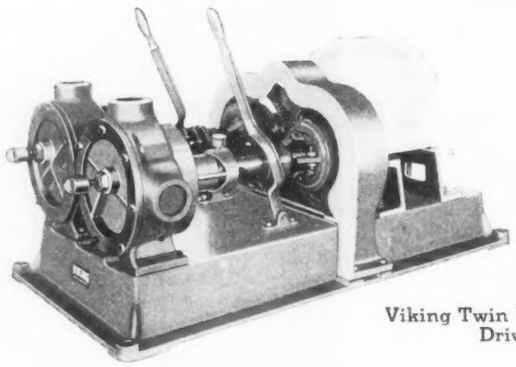
GOOD SERVICE
IS NEVER AN ACCIDENT

WHENEVER you order Viking, you order GOOD Service. This statement has been proved over and over again in practically every phase of the petroleum industry. Today more Viking Pumps are used in the petroleum field than any other make. This, certainly, is a high tribute to Viking performance and economy.

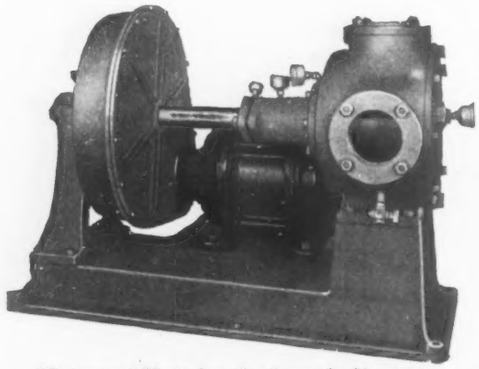


Truck Mounting Pump
With Relief Valve on Head

After 10, 15 and even 20 years, many Viking Pumps are still giving efficient, dependable service. This is not an accident. Viking's 26 years of experience, plus their rigid testing requirements, absolutely ASSURES you of better, trouble-free pumping equipment. At your request complete bulletins and prices will be mailed immediately.



Viking Twin Unit Motor
Drive



Motorized Unit for the large bulk station

VIKING FACTS

Self-Priming
Positive Discharge
Only Two Moving Parts
Low Power Consumption
Long Dependable Life
Handles Any Clean Heavy or Light Liquid

VIKING PUMP COMPANY
CEDAR FALLS, IOWA

Markets

At A Glance . . .

Pennsylvania: U. S. motor gasoline prices down.

Mid-Continent: Gasoline supplies plentiful.

Mid-Western: Michigan gasoline market firmer.

Eastern Seaboard: Jersey Standard announces reductions.

Coastal: Cargo gasoline prices down.

California: West coast market quiet.

Wax: Crude scale market remains quiet.

Pennsylvania

Kerosine at New High

N. P. N. News Bureau

CLEVELAND, Nov. 15.—U. S. Motor gasoline sold down another 0.125 cent at refineries in the lower Pennsylvania field, following a similar decline last week. No change was reported in the upper field, where a price of 6 cents was given as the going market for shipments into western New York state. U. S. motor gasoline supplies were reported relatively small in the upper field, with considerable quantities being reformed.

Kerosine was scarce and commanded a price of 5.50 to 5.75 cents per gallon in tank cars in the upper field, marking the second advance of 0.125 cent since the first of the month. 36-40 fuel oil was also scarce and toward the close of the week was sold up 0.125 cent at 5.125 cents per gallon in the upper field.

These products were likewise in heavy demand in the lower field, but somewhat easier than in the upper field. More than one refiner strove to bear the fuel oil price, it was reported, to prevent loss of customers to other fuels. Quotations and sales in the lower field were 4.75 cents for 36-40 fuel oil and 5.375 for 45 water white kerosine.

Cylinder stocks continued to seek a level, long since reported at rock bottom, but buyers were few, according to reports from the field. 600 steam refined filterable cylinder stock sold to jobbers at 8 cents and high flash stocks lost another cent from prices the previous week. Bright stocks remained steady.

Neutral oils were at unchanged levels generally, but transactions were few as buyers generally hesitated to place orders, according to traders. Some sales were reported at lower levels.

White crude scale wax was firm and production was reported moving out without any waiting to find a market.

Mid-Continent

Natural Gasoline Lower

N. P. N. News Bureau

TULSA, Nov. 15.—Mid-Continent refined and natural gasoline prices continued their downward trend the second week of November. A slight oversupply was one of the disturbing factors in several districts.

Oversupply of refined motor fuel was attributed to decreased consumption and fairly high gasoline production. In efforts to keep gasoline moving out, price reductions of as much as 0.25 cent were made by refiners in some districts. Other refiners, however, continued to quote unchanged prices, content to supply only their local and contract commitments. As the week progressed, there was more jobber and broker interest in gasoline in view of the freight rate increase Nov. 15. Unconfirmed reports of price shading were encountered during the week.

Increased offerings of Grade 26-70 natural gasoline last week resulted in an 0.125-cent price reduction.

Kerosine and range oil were in good position last week. Supplies were closely held and demand sufficiently active to keep inventories low. East Texas and Louisiana kerosine was moving to the Gulf coast; supplies from inland refineries were moving locally and into the midwest.

Mid-Continent lubricating oil prices were unchanged. Shipments against contracts were about normal. Open market business was light. Wax was active.

N.P.N. Gasoline Index

	Dealer T.W. Cents per	Tank Car Gallon
Nov. 15	10.32	6.29
Month ago	10.63	6.63
Year ago	10.03	6.28

Dealer index is an average of "undivided" dealer prices, ex-tax, in 50 cities.

Tank car index is a weighted average of 13 wholesale markets for regular-grade gasoline.

Coastal

Gasolines Easier

N. P. N. News Bureau

NEW YORK, Nov. 15.—Cargo gasoline prices moved to lower levels at the Gulf coast the past week. They were quoted at 0.25 to 0.375 cent a gallon lower for export and 0.25 cent lower for domestic lifting by the end of the week, traders reported.

The 64-66, 375 e. p. gasoline was reported being offered for export lifting at 5.625 cents in some quarters. Other suppliers said they would not go this low to obtain a cargo. They said that there were not so very many cargoes being offered at the Gulf, but that buying had been too light to keep pace with production and that any distress sellers of gasoline would not readily find a purchaser.

Coastwise markets also were quiet and 65 and above octane gasoline was reported available at 5.875 cents f.o.b. the Gulf for cargo movement. No cargo sales were reported during the week.

Several inquiries for cargoes of light fuel oils were reported but no sales were made at the Gulf. However, a cargo of Mexican gas oil, high sulfur, minimum 53 diesel index, was reported sold for European shipment in December on the basis of 4.75 cents a gallon f.o.b. the American Gulf.

Heavy fuel oils were reported unchanged.

Eastern

Jersey Standard Cuts Gasoline

N. P. N. News Bureau

NEW YORK, Nov. 15.—"Due to lower basic gasoline markets, as well as softening in tank steamer charters," in the company's words, Standard Oil Co. of New Jersey reduced consumer tank car and dealer tank wagon prices of Esso (premium) and Essolene (regular) gasoline 0.75 cent throughout its marketing territory Nov. 15, except at sub-normal points. A similar

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). Prices in cents per gallon, except heavy fuel oils in dollars per barrel, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Gasoline *and* Naphtha

Prices Effective	Nov. 15	Nov. 8
OKLAHOMA		
U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.125– 4.50	4.25 – 4.625
63-66 oct.	4.50 – 4.875	4.625– 5.00
67-69 oct.	4.875– 5.25	5.00 – 5.375
70-72 oct.	5.25 – 5.625	5.375– 5.75
60-62, 400 e.p.	*4.375– 4.50	*4.375– 4.50
64-66, 375 e.p.	*4.75 – 5.125	*4.75 – 5.125
68-70, 350-360 e.p.	*5.00 – 5.375	*5.00 – 5.375
WESTERN PENNA.		
Bradford-Warren:		
52-54 naphtha	Prices disct.	
Motor gasoline:		
U. S. Motor (58-62°)	6.00 – 6.25	6.00 – 6.25
Min. 60 oct.	Prices disct.	
Min. 65 oct.	7.75	7.75
64-66, 390 e.p.	6.125– 6.25	6.125– 6.25
68-70, 350-360 e.p.	Prices disct.	
Other districts:		
52-54 naphtha	Prices disct.	
54-56 naphtha	5.25 – 5.375	5.375– 5.50
Motor gasoline:		
U. S. Motor (58-62°)	5.00 – 5.25	5.375– 5.625
Min. 60 oct.	Prices disct.	
Min. 65 oct.	7.25 – 7.875	7.25 – 7.875
64-66, 390 e.p.	5.75 – 5.875	5.75 – 5.875
68-70, 350-360 e.p.	Prices disct.	

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group).

Str.-Run Gasoline	*5.00 – 5.50	5.00 – 5.50
64-66 octane gas.	7.75 – 8.00	7.75 – 8.00
68-70 octane gas.	8.125– 8.50	8.125– 8.50

*Excluding Detroit shipment.

CALIFORNIA (3c tax to be added to prices if used in state)

U. S. Motor:		
54-58, for instate shipment	8.00 – 9.25	8.00 – 9.25
54-58, for outside state shipment	8.50 – 9.00	8.50 – 9.00
58-61, 375-400 e.p., 65 oct. & above	8.75 – 9.75	8.75 – 9.75

†**N. TEX.** (For shipment to Texas and N. Mex. destinations; Group 3 prices quoted on northern shipments).

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.625– 4.875	4.625– 4.875
63-66 oct.	5.125– 5.375	5.125– 5.375
67-69 oct.	5.50 – 5.75	5.50 – 5.75
70-72 oct.	5.75 – 6.00	5.75 – 6.00
60-62, 400 e.p.	*4.625– 4.875	*4.625– 4.875

KANSAS (For Kansas destinations only)

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.50 – 4.75	4.50 – 4.75
63-66 oct.	5.00 – 5.375	5.00 – 5.375
67-69 oct.	5.375– 5.625	5.375– 5.625
70-72 oct.	5.625– 5.875	5.75 – 5.875

†W. TEX.

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.625– 4.75	4.625– 4.75
63-66 oct.	5.125– 5.25	5.125– 5.25
67-69 oct.	5.50 – 5.625	5.50 – 5.625
70-72 oct.	5.75 – 5.875	5.75 – 5.875
†E. TEX.		
60-62, 400 e.p.	*4.375– 4.625	*4.625– 4.75

N. LA. (For shipment within La. & into Ark.)

U. S. Motor: (a) (Octane Test L-3)		
62 oct. & below	4.75 – 5.00	4.75 – 5.00
63-66 oct.	5.00 – 5.25	5.00 – 5.25
67-69 oct.	5.25 – 5.50	5.25 – 5.50
70-72 oct.	5.75 – 5.875	5.75 – 5.875

ARKANSAS (For shipment within Ark. & into La.)

U. S. Motor: (a) (Octane Test L-3)		
62 octane & below	4.75	4.75
67-69 oct.	5.50	5.50

OHIO (Quotations of S. O. Ohio. Delivered anywhere in Ohio).

U. S. Motor	8.00	8.25
Above 65 oct.	8.25	8.50

Natural Gasoline

(Prices are those to blenders on freight basis shown below. Shipments, however, may originate in other Mid-Continent manufacturing districts, such as Panhandle Texas, S. W. Texas or Kans.)

F.O.B. GROUP 3		
Grade 26-70	3.75 – 3.875	4.00 – 4.25

*Nominal.

‡Only one refiner quoting.

†Refiners report they generally receive from 0.25c to 0.5c per gal. more for gasoline & kerosine for local or differential territory shipment.

(a) In line with National Petroleum News' policy of reflecting general trade practice, the above revisions in octane brackets, determined according to L-3 method, for U. S. Motor gasoline, have been made in the Okla. and Kans. markets, effective Sept. 20, 1937; in North and West Texas, Arkansas, and North Louisiana, Oct. 4. Formerly, octane numbers were: 62 & below, 63-67, and 68-70.

Prices Effective	Nov. 15	Nov. 8
Natural Gasoline (Cont'd)		
F.O.B. BRECKENRIDGE		
*Grade 26-70	3.75	3.875– 4.125
CALIFORNIA (F.o.b. plants in Los Angeles basin)		
75-85, 350-375 e.p. for blending	7.25 – 7.75	7.25 – 7.75

Kerosine

WESTERN PENNA.		
Bradford-Warren:		
45 w.w.	5.50 – 5.75	5.375– 5.50
46 w.w.	5.625– 5.875	5.50 – 5.625
47 w.w.	5.75 – 6.00	5.625– 5.75
Other districts:		
45 w.w.	5.375– 5.50	5.375– 5.50
46 w.w.	5.50 – 5.625	5.50 – 5.625
47 w.w.	5.625– 5.75	5.625– 5.75

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.)

47-49 w.w.	5.05 – 5.30	5.05 – 5.30
OKLAHOMA		
41-43	4.00 – 4.25	4.00 – 4.25
42-44 w.w.	4.25 – 4.375	4.25 – 4.375

KANSAS (For Kansas destinations only).

41-43 w.w.	4.375– 4.50	4.375– 4.50
42-44 w.w.	4.50 – 4.625	4.50 – 4.625

†**N. TEX.** (For shipment to Texas and New Mexico destinations; Group 3 prices quoted on northern shipments).

41-43 w.w.	4.25 – 4.375	4.25 – 4.375
†E. TEX.		
41-43 w.w.	*4.00	*4.00 – 4.125

N. LA. (For shipment within La. and into Ark.).

41-43 w.w.	4.50	4.50

ARK. (For shipment within Ark. and into La.).

41-43 w.w.	‡4.50	‡4.50
CALIFORNIA		
40-43 w.w.	6.00 – 7.00	6.25 – 7.00

Gas *and* Fuel Oils

WESTERN PENNA.		
Bradford-Warren:		
36-40	5.125	5.00 – 5.125
Other districts: (Excluding Pittsburgh District Prices).		
36-40	4.75 – 4.875	4.75 – 4.875

CENTRAL MICHIGAN (Prices f.o.b. Cent. Mich. refinery group basis, for shipment within Michigan. Shipments, however, may originate at plants outside Central group.

P.W. Distillate	4.875– 5.25	4.875– 5.25
No. 3 gas oil, str.	4.625– 4.75	4.50 – 4.75
U.G.I. gas oil	4.50 – 4.75	4.375– 4.50
Fuel Oils (Vis. at 100):		
500-700 Vis.	3.00 – 3.25	3.25 – 3.50
300-500 Vis.	3.125– 3.50	3.375– 3.75
100-300 Vis.	3.25 – 3.75	3.50 – 4.25
OKLAHOMA		
No. 1 white	4.00 – 4.125	4.00 – 4.125
No. 1 straw	3.75 – 4.00	3.75 – 4.00
No. 2 straw	3.625– 3.875	3.625– 3.875
No. 2 dark	3.50 – 3.625	3.50 – 3.625
U. G. I. gas oil	*3.375	*3.375
28-30 zero	*3.50 – 3.625	*3.50 – 3.625
28-30	‡$1.35	‡$1.35
24-26	‡$0.925	‡$0.925
18-22	*$0.825–$0.90	*$0.825–$0.90
14-16	*$0.80 –$0.85	*$0.80–$0.85

KANSAS (For Kans. destinations only).

No. 1 p.w. fuel oil	4.125– 4.25	4.125– 4.25
10-14 fuel oil	$0.725–$0.775	$0.725–$0.775

N. TEX. (For shipment to Texas and N. Mex.; Group 3 prices quoted on northern shipments).

No. 1 white	*4.125	*4.125
U. G. I. gas oil	3.00 – 3.125	3.00 – 3.125
24-26	$0.85 –$0.875	$0.85 –$0.875
18-22	$0.80 –$0.825	$0.80 –$0.825

N. LA. (For shipment within La. and into Ark.).

No. 2	3.50 – 3.625	3.50 – 3.625
20-24	$1.10 –$1.15	$1.10 –$1.15
16-20	$0.95 –$1.00	$0.95 –$1.00
10-14	$0.80 –$0.85	$0.80 –$0.85

ARK. (For shipment within Ark. and into La.).

No. 2	‡3.75	‡3.75
28-30 gas oil, zero	‡3.50	‡3.50
CALIFORNIA		
San Joaquin Valley:		
Heavy fuel	$0.60 –$1.00	$0.60 –$1.00
Light fuel	$0.85 –$1.10	$0.85 –$1.10
Diesel fuel (per gal.)	3.75 – 5.00	3.75 – 5.00
Stove dist. (per gal.)	4.25 – 7.00	4.25 – 7.00
Los Angeles:		
Heavy fuel	$0.70 –$1.10	$0.65 –$1.10
Light fuel	$0.90 –$1.20	$0.90 –$1.20
Diesel fuel (per gal.)	3.50 – 5.00	3.50 – 5.00
Stove dist. (per gal.)	4.00 – 7.00	3.75 – 7.00

Prices Effective	Nov. 15	Nov. 8
Gas and Fuel Oils (Cont'd		
San Francisco:		
Heavy fuel	$1.15	$1.15
Light fuel	$1.25	$1.25
Diesel fuel (per gal.)	5.50	5.50
Stove dist. (per gal.)	7.50	7.50

Note: All above heavy fuels meet Pacific specification 400; light fuel, spec. 300; Diesel fuels, spec. 200; and stove distillate, spec. 100.

Neutral Oils

WESTERN PENNA.

Viscous Neutrals (*Viscosity at 70° F.*)

200 Vis. (180 at 100°) No. 3 col., 420-425 fl.:		
0 p.t.	23.00 –23.50	25.00 –25.50
10 p.t.	22.00 –22.50	24.00 –24.50
15 p.t.	21.50 –22.00	23.50 –24.00
25 p.t.	20.50 –21.00	22.50 –23.00
180 Vis. (165 at 100) No. 3 col., 410-415 fl.:		
25 p.t.	19.00 –19.50	21.00 –21.50
150 Vis. (143 at 100) No. 3 col., 400-405 fl.:		
0 p.t.	19.00 –19.50	21.00 –21.50
10 p.t.	18.00 –18.50	20.00 –20.50
15 p.t.	17.50 –18.00	19.50 –20.00
25 p.t.	16.50 –17.00	18.50 –19.00

SOUTH TEXAS

Vis. Color		
Pale Oils: (*Vis. at 100° F.; p.t. 0*)		
100 No. 1½-2½	5.25 – 5.50	5.25 – 5.50
200 No. 2-3	7.25 – 7.50	7.25 – 7.50
300 No. 2-3	7.75 – 8.00	7.75 – 8.00
500 No. 2½-3½	8.75 – 9.00	8.75 – 9.00
750 No. 3-4	9.25 – 9.50	9.25 – 9.50
1200 No. 3-4	9.75 –10.00	9.75 –10.00
2000 No. 4	10.00 –10.25	10.00 –10.25
Red Oils:		
200 No. 5-6	7.25 – 7.50	7.25 – 7.50
300 No. 5-6	7.75 – 8.00	7.75 – 8.00
500 No. 5-6	8.75 – 9.00	8.75 – 9.00
750 No. 5-6	9.25 – 9.50	9.25 – 9.50
1200 No. 5-6	9.75 –10.00	9.75 –10.00
2000 No. 5-6	10.00 –10.25	10.00 –10.25

Note: South Texas red oil prices shown above cover oils with green cast; blue cast red oils are slightly lower in some cases.

MID-CONTINENT (Vis. at 100° F.; F.o.b. Tulsa basis).

(0 to 10 P.P.)

Pale Oils: Vis. Color		
60-85—No. 2	5.50	5.50
86-110—No. 2	6.00	6.00
150—No. 3	9.00	9.00
180—No. 3	10.00	10.00
200—No. 3	10.50	10.50
250—No. 3	11.50	11.50
280—No. 3	12.50	12.50
300—No. 3	13.00	13.00
Red Oils:		
180—No. 5	9.00	9.00
200—No. 5	9.50	9.50
250—No. 5	10.50	10.50
280—No. 5	11.50	11.50
300—No. 5	11.75	11.75

Note: Viscous oils, 15-25 p.p., generally are quoted 0.5c under 0-10 p.p. oils. Non-viscous oils, 15-25 p.p., generally are quoted 0.25c under 0-10 p.p. oils. Viscous oils (150-300 vis.), No. 4 color, generally are quoted 0.5c above No. 5 color oils.

CHICAGO (Vis. at 100° F.)

Pale Oils **0 to 10 p.p.:

Vis. Color		
60-85—No. 2	7.25	7.25
86-110—No. 2	7.75	7.75
150—No. 3	10.00	10.00
180—No. 3	11.00	11.00
200—No. 3	11.50	11.50
250—No. 3	12.50	12.50
Red Oils:		
180—No. 5	10.00	10.00
200—No. 5	10.50	10.50
250—No. 5	11.50	11.50
280—No. 5	12.50	12.50
300—No. 5	12.75	12.75

**Viscous oils, 15 to 30 p.p. are quoted 0.5c lower, 60-85 and 86-110 No. 2 non-viscous oils, 15 to 30 p.p., are quoted 0.25c lower. To obtain delivered prices in Chicago, add 0.25c per gal.

Cylinder Stocks

MID-CONTINENT (F.o.b. Tulsa basis).

Bright Stocks:		
190-200 Vis. at 210° D	20.00	20.00
150-160 Vis. at 210° D:		
0 to 10 p.p.	17.00	17.00
10 to 25 p.p.	16.00	16.00
25 to 40 p.p.	16.00	16.00
150-160 vis. at 210° E	16.00	16.00

GEARED SELLING

Successful jobbers know the value of keeping their dealers "geared up" and enthusiastic. They'll be more responsive, do a better job of selling and render better service with MARATHON LUBRICANTS.

MARATHON LUBRICANTS offer dealers an almost unequaled opportunity for volume sales and profits. There is a complete line of MARATHON gear lubricants and one especially adapted for every type gear and every lubricating problem.

MARATHON LUBRICANTS will not freeze up or congeal at temperatures far below zero, nor will they thin out at high engine temperatures. MARATHON LUBRICANTS protect moving parts at all operating speeds.

Aggressive jobbers and dealers: take advantage of the exclusive territory franchise offered by the Ohio Oil Company. Write, Phone or Wire for complete particulars at no further obligation to you.

THE OHIO OIL COMPANY

GENERAL OFFICES - - - - FINDLAY, OHIO

ROBINSON, ILLINOIS TULSA, OKLAHOMA FT. WORTH, TEXAS

reduction was made by the Standard of Louisiana, officials announced.

The Standard announcements were not made until late Saturday, Nov. 13, and the effect on jobber tank car markets for unleaded gasolines was not apparent as the week ended. Tank car markets for these gasolines have been gradually moving to lower levels at eastern seaboard terminals for several weeks.

The possibility of a general reduction in Texas and Mid-Continent crude oils came in for considerable comment the past week due to the continued softness in the wholesale and retail gasoline markets. Some traders said they were expecting a cut, adding that it was needed to bring crude costs in line with present refinery netbacks. Others, however, said that there appeared to be little chance of a crude price reduction, regardless of the lower netbacks on refined products.

Kerosine markets were quiet at most terminals. Some kerosine was reported moving at 6 cents f.o.b. terminals at Norfolk and Charleston during the week, compared to previous prices of 6.25 cents.

Wax

Scale Dull

NEW YORK, Nov. 15.—The market for crude scale wax was reported dull the past week. No changes were reported in prices, with quotations said to be ranging from 2.85 to 2.95 cents a pound f.a.s. New York.

Reports on market conditions were about the same as in previous weeks—buying light, but suppliers not pushing sales in the open market. Export buyers were reported to be willing to take scale wax at lower prices, although suppliers were unwilling to shade present lows, it appeared.

No changes were reported in fully refined wax markets, either in prices or demand.

California

Market Generally Unchanged

N. P. N. News Bureau

LOS ANGELES, Nov. 13.—West coast market spot quotations were practically unchanged the past seven days from those the previous week.

Far East buyers were reported making some exploratory inquiry for aviation gasoline—in drums, and for fuel oil, but negotiations were said to be far from an actual sale.

Bids by local suppliers on Pacific coast fuel oil requirements by the U. S. navy for the first six months of 1938 will be opened in Washington Nov. 16, and there is considerable speculation as to the range in quoted prices. The demand will be for about 3,500,000 barrels during the period. Ideas expressed by some suppliers indicated about 90 cents a barrel as the minimum.

Most independent plants were asking 8.25 cents for third-grade gasoline delivered to service stations in the Los Angeles area. The price is exclusive of all tax and is for tank truck and trailer lots. Tank wagon deliveries by these suppliers were 0.25 cent higher. One or two plants were asking only 8 cents for similar products.

Fuel Oil . . . . .

N. P. N. News Bureau

CHICAGO, Nov. 15. — Mild weather over much of the middle west has delayed the start of the heating oil season, and movement of light fuel oils suffered somewhat, although prices remained steady and were a bit higher in some cases.

Partial shutdowns of industrial plants throughout the middle west has resulted in a softening of heavy fuels oils, and prices were lowered the week ended Nov. 13. Absence of an active demand from automotive plants in lower Michigan has resulted in a storage buildup of heavy fuel oils which is said to be causing no little concern among many refiners in the Michigan district.

Mid-Western

Gasoline Prices Lower

N. P. N. News Bureau

CHICAGO, Nov. 15.—Gasoline prices again were lowered in the Mid-Western market the week ended Nov. 13. Traders in the majority here had said they felt that gasoline prices would settle at around 4.125-4.25 cents for low octane

(*Continued on page* 60)

NEW YORK, Nov. 15.—Light fuel oil markets were reported inactive the past week along the eastern seaboard. Occasional reports of price shading on Nos. 2 and 4 oils were heard, but apparently no large quantities were available at the lower prices for tank car or barge movement. Retail tank wagon prices for light fuel oils were unsettled at many points. Terminal stocks were reported heavy and weather conditions so far have not been such as to bring a heavy consumer demand, although it was reported about normal.

Heavy fuel oils were reported quiet after the reductions in the previous week.

* * *

TULSA, Nov. 15.—Light fuel oils were closely held by most Mid-Continent suppliers last week. The majority of refiners was shipping only to contract customers. Supplies available in the open market were limited. Prices were steady.

Mixed trends were noted in heavy fuel markets. Some refiners reported railroads were taking out only the minimum amounts outlined in their contracts and buying the rest of their needs in the open market. Indications were that open market prices were lower than those paid under contract.

Other refiners reported railroad orders, while somewhat light, were in sufficient volume to take care of their reduced output of heavy oil. Drilling contractors in north and central Texas were furnishing an outlet for fuel in that area.

TANK WAGON MARKETS, HEATING OILS

Prices in Effect Nov. 15, 1937

Following are tank wagon prices of various grades of heating oil at the points shown in various territories. Prices are in cents per gallon.

	No. 1	No. 2	No. 3	No. 4
S. O. NEW JERSEY				
Newark, N. J.	*	7.00	7.00	7.00
Atlantic City, N. J.	*	7.00	7.00	7.00
Baltimore, Md.	8.00	7.00	7.00	7.00
Washington, D. C.	8.50	7.75	7.75	7.75
SOCONY-VACUUM OIL CO. INC. (S. O. New York Division)				
New York City	*	7.50	7.50	7.50
Albany, N. Y.	*	7.50	7.50	7.50
Rochester, N. Y.	*	7.50	7.50	7.50
Boston, Mass.	*	7.00	7.00	7.00
Bangor, Me.	*	8.00	8.00	8.00
Manchester, N. H.	*	8.00	8.00	8.00
Burlington, Vt.	*	8.00	8.00	8.00
New Haven, Conn.	*	7.50	7.50	7.50
Providence, R. I.	*	7	7	7

*Prices for No. 1 fuel in S. O. New Jersey and Socony-Vacuum territories same as for kerosine, which see in tank wagon table for various cities; prices change with kerosine.

	No. 1	No. 2	No. 3	No. 4
ATLANTIC REFINING				
Philadelphia, Pa.	7.75	7.00	7.00	7.00
Allentown, Pa.	7.75	7.00	7.00	7.00
Wilmington, Del.	8.25	7.50	7.50	7.50
Springfield, Mass.	9.00	7.50	....	7.50
Worcester, Mass.	9.00	7.50	....	7.50
Hartford, Conn.	9.00	7.50	....	7.50

S. O. OHIO

*Ohio Statewide	8.00	8.00	7.50	6.75

Note: S. O. Ohio prices are for hose dumps, bucket dumps are 0.5c per gallon higher.

*Except Cleveland Division and City of Toledo. In Cleveland Division (Cuyahoga, Lake and Geauga counties), No. 1 price is same as statewide; Nos. 2, 3 and 4 are 0.5c higher; No. 5 is priced 0.25c lower than No. 4. In Toledo No. 2 is 0.5c lower than statewide, others same.

S. O. INDIANA

Stanolex Fuel and Furnace Oils

	No. 1 Fuel	Stanolex Furnace
Chicago	†8.8	7.00
Indianapolis	...	*11.8
Detroit	...	7.1
Milwaukee	8	7.3
Minneapolis	7.5	7.5
Sioux City	7.1	7.1
St. Louis	7.5	6.8
Kansas City	6.5	6.5

*Includes state tax of 4c.

†This price applies to 1 to 99 gals. deliveries; 150 gals. and over, 7c.

Note: Small-lot deliveries of light fuel oils range up to 2c higher than above quotations.

REFINERY TANK CAR MARKETS

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days) unless otherwise stated. Prices in cents per gallon, except heavy fuel oils in dollars per barrel, tank car lots, f.o.b. refineries in districts designated, except where otherwise noted. Inter-refinery and export prices not included, unless so stated in the respective markets. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Cylinder Stocks (cont'd)

Prices Effective	Nov. 15	Nov. 8
Mid-Continent (cont'd)		
120 Vis. at 210° D:		
0 to 10 p.p.	16.00	16.00
10 to 25 p.p.	15.50	15.50
25 to 40 p.p.	15.125	15.00
600 S.R. Dark Green	5.00 – 7.50	5.00 – 7.50
600 S.R. Olive Green	7.00 – 9.50	7.00 – 9.50
631 S.R.	‡14.00	‡14.50
Black Oil	3.50 – 4.00	3.50 – 4.00
CHICAGO (Viscosity at 210°)		
Unfiltered Steam Refined:		
140	9.00	9.00
160	10.00	10.00
200	11.00	11.00
Bright stocks, 160 vis. at 210. No. 8 color:		
0 to 10 p.p.	18.75	18.75
15 to 25 p.p.	17.75	17.75
30 to 40 p.p.	17.25	17.25
E filtered Cyl. Stock	14.50	14.50

To obtain prices delivered in Chicago, add 0.25c per gal.

‡Only one refiner quoting.

Prices Effective	Nov. 15	Nov. 8
WESTERN PENNA.		
600 S.R. filterable	8.00 – 9.50	9.00 – 9.50
650 S.R.	11.50 – 13.00	12.50 – 14.00
600 fl.	12.00 – 14.00	13.00 – 14.00
630 fl.	16.00 – 17.00	17.00 – 18.00
600 Warren E.	13.00 – 14.00	14.00 – 15.50
Bright stock, 145-155 vis. at 210°, 540-550 flash, No. 8 color:		
10 p.t.	19.00 – 19.50	19.00 – 19.50
15 p.t.	18.00 – 18.50	18.00 – 18.50
20 p.t.	17.00 – 17.50	17.00 – 17.50
25 p.t.	16.00 – 16.50	16.00 – 16.50

Petrolatums

WESTERN PENNA. (Per lb., in barrels, carload lots. In tank cars, 0.5c per lb. less).

Prices Effective	Nov. 15	Nov. 8
Snow white	6.625 – 6.75	6.625 – 6.75
Lily White	5.625 – 5.75	5.625 – 5.75
Cream White	4.625 – 4.75	4.625 – 4.75
Light Amber	2.75 – 2.875	2.75 – 2.875
Amber	2.50 – 2.625	2.50 – 2.625
Red	2.125 – 2.375	2.125 – 2.375

Wax

Prices Effective	Nov. 15	Nov. 8
WESTERN PENNA. (Per lb., f.o.b. N. Y. basis)		
122-124 w.c. scale, A.m.p.	2.95 – 3.00	2.95 – 3.00
124-126 w.c. scale, A.m.p.	2.95 – 3.00	2.95 – 3.00
OKLAHOMA (Per lb. in bbls.; in a few instances, per lb. in burlap bags).		
124-126 w.c. scale, A.m.p.	3.00 – 3.125	3.00 – 3.125

CHICAGO (In bags, carload lots. Melting points are E.M.P. (A.S.T.M.) methods; add 3° F. to convert into A.m.p.)

Fully refined:		
122-124	4.65 – 4.75	4.65 – 4.75
125-127	4.90 – 5.00	4.90 – 5.00
127-129	5.05 – 5.15	5.05 – 5.15
130-132	**5.45 – 5.55	**5.45 – 5.55
132-134	**5.70 – 5.80	**5.70 – 5.80
135-137	**6.45 – 6.55	**6.45 – 6.55

**Same prices quoted in bags or slabs loose.

MID-WESTERN TANK CAR MARKET

Prices are those made by Chicago sellers, on Group 3 (Oklahoma) freight basis, although shipments may originate in other South-western or Mid-western refining districts

Gasoline

Prices Effective	Nov. 15	Nov. 8
U. S. Motor:		
62 oct. and below	4.00 – 4.50	4.125 – 4.50
63-67 oct.	4.25 – 4.50	4.75 – 5.25
68-70 oct. (regular)	4.875 – 5.50	5.125 – 5.625
60-62, 400 e.p.	4.00 – 4.50	4.25 – 4.625
64-66, 375 e.p.	**5.00	**5.00
68-70, 350-360 e.p.	**5.25	**5.25

Kerosine

41-43 w.w.	4.00 – 4.25	4.00 – 4.25
42-44 w.w.	4.125 – 4.375	4.125 – 4.375

**One seller quoting.

Fuel *and* Gas Oils

Prices Effective	Nov. 15	Nov. 8
Domestic:		
No. 1 p.w.	4.00 – 4.125	4.00 – 4.125
No. 1 straw	3.875 – 4.00	3.875 – 4.00
No. 2 straw	3.625 – 3.75	3.625 – 3.75
No. 2 dark	3.50 – 3.625	3.50 – 3.625
No. 3	3.375 – 3.50	3.375 – 3.50
No. 4	$1.05 – $1.10	$1.05 – $1.10
No. 5	$0.80 – $0.85	$0.80 – $0.85
Range oil	4.00 – 4.125	4.00 – 4.125
Industrial:		
No. 4	$0.95 – $1.10	$0.95 – $1.10
No. 5	$0.775 – $0.85	$0.80 – $0.85

Prices Effective	Nov. 15	Nov. 8
Industrial (cont'd)		
No. 6	$0.60 – $0.70	$0.675 – $0.725
U. G. I. gas oil	2.875 – 3.25	2.875 – 3.25

Naphtha and Solvent

Stoddard solvent	6.375 – 6.875	6.375 – 6.875
Cleaners' naphtha	6.875 – 7.375	6.875 – 7.375
V. M. & P. naphtha	6.875 – 7.375	6.875 – 7.375
Mineral spirits	5.875 – 6.375	5.875 – 6.375
Rubber solvent	6.875 – 7.375	6.875 – 7.375
Lacquer diluent	7.875 – 8.375	7.875 – 8.375

DAILY GASOLINE PRICES

Daily range of gasoline prices as reported in PLATT'S OILGRAM. (Week Ended Nov. 12, 1937)

U. S. Motor, (Octane Number determined according to L-3 Method):	Nov. 8	Nov. 9	Nov. 10	Nov. 11	Nov. 12
62 octane and below:					
Oklahoma	4.25 – 4.625	4.25 – 4.625	4.125 – 4.625	4.125 – 4.625	4.125 – 4.625
*North Texas	4.625 – 4.875	4.625 – 4.875	4.625 – 4.875	4.625 – 4.875	4.625 – 4.875
West Texas	4.625 – 4.75	4.625 – 4.75	4.625 – 4.75	4.625 – 4.75	4.625 – 4.75
63-66 octane:					
Oklahoma	4.625 – 5.00	4.625 – 5.00	4.50 – 5.00	4.50 – 5.00	4.50 – 5.00
*North Texas	5.125 – 5.375	5.125 – 5.375	5.125 – 5.375	5.125 – 5.375	5.125 – 5.375
West Texas	5.125 – 5.25	5.125 – 5.25	5.125 – 5.25	5.125 – 5.25	5.125 – 5.25
67-69 octane:					
Oklahoma	5.00 – 5.375	5.00 – 5.375	4.875 – 5.375	4.875 – 5.375	4.875 – 5.375
*North Texas	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75	5.50 – 5.75
West Texas	5.50 – 5.625	5.50 – 5.625	5.50 – 5.625	5.50 – 5.625	5.50 – 5.625
70-72 octane:					
‡Oklahoma	5.375 – 5.75	5.375 – 5.75	5.25 – 5.75	5.25 – 5.75	5.25 – 5.75
*North Texas	5.75 – 6.00	5.75 – 6.00	5.75 – 6.00	5.75 – 6.00	5.75 – 6.00
West Texas	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875	5.75 – 5.875
U. S. Motor, Mid-Western Market (Group 3 Basis):					
62 octane and below	4.125 – 4.50	4.125 – 4.50	4.125 – 4.50	4.125 – 4.50	4.00 – 4.50
63-67 octane	4.75 – 5.25	4.75 – 5.25	4.75 – 5.25	4.75 – 5.25	4.50 – 5.00
68-70 octane (regular)	5.125 – 5.625	5.125 – 5.625	5.125 – 5.625	5.125 – 5.625	5.00 – 5.50
Motor Gasoline, 60-64 oct.					
New York harbor	†7.25	†7.25	†7.25	†7.25	†7.25
Philadelphia district	†7.25	†7.25	†7.25	†7.25	†7.25
Baltimore district	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50
Motor Gasoline, 65 oct. & above					
New York harbor	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50	†7.25 – 7.50
Philadelphia district	†7.50	†7.50	†7.50	†7.50	†7.50
Baltimore district	†7.50 – 7.75	†7.50 – 7.75	†7.50 – 7.75	†7.50 – 7.75	†7.50 – 7.75
U. S. Motor, 58-62°					
Bradford-Warren (Western Penna.)	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25	6.00 – 6.25
Other districts (Western Penna.)	5.375 – 5.625	5.375 – 5.625	5.375 – 5.625	5.25 – 5.50	5.25 – 5.50
Motor Gasoline, Min. 65 oct.					
Bradford-Warren (Western Penna.)	†7.75	†7.75	†7.75	†7.75	†7.75
Other districts (Western Penna.)	7.25 – 7.875	7.25 – 7.875	7.25 – 7.875	7.25 – 7.875	7.25 – 7.875

*For shipment to Texas and New Mexico destinations; Group 3 prices are quoted on northern shipment.

†Nominal.

‡Correction: Price as of Oct. 28 was 5.625-6.00c, instead of 5.75-6.00c as shown on page 19 of Nov. 3 issue.

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 15, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. New Jersey

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Tax-es	Posted S.S.	Kero-sine T.W.
Atlantic City, N. J.	7.25	8.75	4	*	9
Newark, N. J.	7.25	8.75	4	*	9
Annapolis, Md.	8.35	9.85	5	*	9.5
Baltimore, Md.	7.75	9.25	5	18.5	9
Cumberland, Md.	9.15	11.65	5	*	10
Washington, D. C.	7.25	8.75	3	16	9.5
Danville, Va.	8.95	11.45	6	*	12.9
Norfolk, Va.	7.75	10.25	6	*	11.5
Petersburg, Va.	8.05	10.55	6	*	11.7
Richmond, Va.	8.05	10.55	6	*	11.7
Roanoke, Va.	9.25	11.75	6	*	12.9
Charleston, W. Va.	8.35	10.5	6	*	12.6
Parkersburg, W. Va.	7.85	10.35	6	*	11.2
Wheeling, W. Va.	8.75	11	6	*	12.2
Charlotte, N. C.	9.15	11.65	7	*	12.6
Hickory, N. C.	9.65	12.15	7	*	13
Mt. Airy, N. C.	9.45	11.95	7	*	12.8
Raleigh, N. C.	8.75	11.25	7	*	12.1
Salisbury, N. C.	9.25	11.75	7	*	12.7
Charleston, S. C.	7.75	10.25	7	*	11.1
Columbia, S. C.	8.75	11.25	7	*	12.1
Spartanburg, S. C.	9.45	11.95	7	*	12.9

*S. O. New Jersey transferred stations to dealers; no prices available.

Price basis to undivided dealers: Dealer t.w. price less 0.5c per gal.

Price basis to commercial consumers: To contract accounts, purchasing at least one full compartment at a time by hose connection: Effective March 12, 1937, in New Jersey, and March 8 in Maryland, District of Columbia, and in Arlington and Fairfax Counties in Virginia, on yearly purchases: from 2,500 to 100,000 gals., consumer t.w. price at time and place of delivery; 100,000 gals. per year, consumer tank car price, plus 0.5c per gal. Generally consumer t.w. price in foregoing states is equivalent of dealer t.w. price, less 0.5c per gal.

Effective May 15, 1937, on Esoplene and Esso (by tank wagon) in North and South Carolina, West Virginia and Virginia (except Arlington and Fairfax Counties, which see above), commercial consumers taking deliveries of 50 gals. (West Va. 100 gals.) or more at one time will be billed at the posted consumer t.w. price. Deliveries less than 50 gals. (West Va. 100 gals.) will be billed at 4c per gal. over posted consumer t.w. price. Generally, posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Kerosine Discount: 1c off t.w. price for 25 gals or more, under contract thru territory (Baltimore City contract not necessary) except no discount in state of New Jersey.

Socony-Vacuum Oil Co., Inc.

(S. O. New York Division)

SOCONY MOBILGAS

	Consumer Tank Car	"Split" Dealer T.W.	Tax-es	Total "Split" Dealer T.W.	Kero-sine T.W.
Metropolitan N. Y. City: Boroughs of Manhattan, Bronx and Brooklyn (Kings and Queens)	8	9.5	*5	14.5	9
Borough of Richmond (Staten Is.)	8	9.5	*5	14.5	9
Albany, N. Y.	8	9.5	5	14.5	9
Binghamton, N. Y.	8.75	10.3	5	15.3	9
Buffalo, N. Y.	8.54	10.05	5	15.05	8.5
Jamestown, N. Y.	8.28	10.8	5	15.8	8.25
Plattsburg, N. Y.	8.4	10.4	5	15.4	9.5
Rochester, N. Y.	8.67	10	5	15	8.5
Syracuse, N. Y.	9.7	10	5	15	9.5
Danbury, Conn.	8.3	9.8	4	13.8	9
Hartford, Conn.	8.1	9.6	4	13.6	9
New Haven, Conn.	8	9.5	4	13.5	9
Bangor, Me.	8.6	8.8	5	13.8	9.5
Portland, Me.	8	9.8	5	14.8	8.75
Boston, Mass.	8	9	4	13	8.5
Concord, N. H.	8.7	11.3	5	16.3	9.5
Lancaster, N. H.	9.6	12.3	5	17.3	10.25
Manchester, N. H.	8.5	10.8	5	15.8	9.5
Providence, R. I.	8	9.5	4	13.5	8.5
Burlington, Vt.	8.4	10.4	5	15.4	9.5
Rutland, Vt.	8.7	10.7	5	15.7	9

*Plus 2% city sales tax computed at time of each sale.

Note: Socony-Vacuum has transferred all service stations to dealers; no prices available.

Price basis to undivided dealers: 0.5c less than "split" dealer t.w.

Price basis to commercial consumers: Effective about Nov. 15, 1936 in New York and New England, for tank wagon delivery: monthly purchases of 25,000 gals. or over, pay consumer tank car price at point of delivery, plus 0.5c gal.; monthly purchases of 5,000 to 25,000 gals., pay undivided dealer tank wagon price at point of delivery; monthly purchases of less than 5,000 gals., pay divided dealer tank wagon price at point of delivery. Private consumers pay undivided dealer tank wagon price at point of delivery, plus 2c gal.

Atlantic Refining

ATLANTIC WHITE FLASH GASOLINE

	Commercial Tank Car	All Tax	Total Dealer T.W.	S.S.	Kero-sine T.W.
Philadelphia, Pa.	7.5	5	14	17	10.5
Pittsburgh	8.5	5	15.5	20	11
Allentown	8.5	5	15	**	11
Erie	8	5	14.5	**	10
Scranton	8.5	5	15	**	11
Altoona	8.5	5	15.5	**	11
Harrisburg	8.5	5	15	**	11
Williamsport	8.5	5	15.5	**	11
Dover, Del.	...	5	14.5	**	11
Wilmington	...	5	13.5	**	11
Boston, Mass.	...	4	13	**	8.5
Springfield, Mass.	...	4	13.3	**	9
Worcester, Mass.	...	4	14.3	**	9
Fall River, Mass.	...	4	13	**	8.5
Hartford, Conn.	...	4	14.1	**	9
New Haven, Conn.	...	4	14	**	9
Providence, R. I.	...	4	14	**	8.5
Atlantic City, N. J.	...	4	13.5	**	9
Camden, N. J.	...	4	13.5	**	9
Trenton, N. J.	...	4	13.5	**	9
Annapolis, Md.	...	5	15.6	**	9.5
Baltimore, Md.	...	5	15	**	9
Hagerstown, Md.	...	5	16	**	10
Richmond, Va.	...	6	16.3	**	11.7
Wilmington, N. C.	...	7	18.1	**	11.3
Brunswick, Ga.	...	7	16	**	*13
Jacksonville, Fla.	...	8	17.5	**	11

*Georgia has kerosine tax of 1c per gal., not included in above price.

**Atlantic Refining transferred stations to dealers; no prices available.

Price basis to undivided dealers: Dealer t.w. less 0.5c per gal.

Price basis to commercial consumers: in Penna. and Delaware, effective Mar. 11, 1937, on yearly gasoline purchases to contract accounts taking full compartment hose deliveries, using 100,000 gals. or more per year, tank car price plus 0.5c per gal.; consumers taking less than 100,000 gals., undivided dealer price. Consumers under contract and not under contract, taking less than full compartment delivery, and consumers not under contract taking full compartment delivery, get divided dealer price. Consumers taking less than 25 gals., t.w delivery, get 4c above undivided dealer price.

Discount on kerosine: Effective Oct. 29, 1936, in Pennsylvania and Delaware. 2c per gal. off t.w. price on t.w. deliveries of 25 gals. or more at one time.

S. O. Ohio

SOHIO X-70 GASOLINE

	All Tax	Consumer T.W.	**Commercial T.W.	†Divided Dlr.	Kerosine T.W.
Ohio State-Wide	5	16.5	....	15.5	*13
Allen, Auglaize, Champaign, Darke, Geauga, Logan, Lorain, Mercer, Putnam, Shelby and Van Wert counties:	5	16.5	15	15.5	....
Defiance county	5	15.5	....	14.5	....
Counties where prices are below statewide:					
Columbiana and Pickaway	5	16	....	15	....
Franklin and Knox	5	15.5	....	14.5	....
Paulding	5	15	13.5	14	....

RENOWN GASOLINE (Third Grade)

Ohio State-Wide	5	16	....	15	....
Allen, Auglaize, Champaign, Geauga, Logan, Lorain, Mercer, Putnam, Shelby and Van Wert counties:	5	16	14.5	15	....
Defiance county	5	15	....	....	....
Erie, Fulton, Lucas, Ottawa, Sandusky, Williams and Wood	5	16	....	15	....
Hamilton county	5	16.5	....	15.5	....
Counties where prices are below statewide:					
Columbiana and Pickaway	5	15.5	....	14.5	....
Franklin and Knox	5	15	....	14	....
Paulding	5	14.5	13	13.5	....
Counties where prices are above statewide:					
Butler, Clermont, Greene, Miami, Montgomery, Preble and Warren	5	16.5	....	15.5	....
Darke county	5	16.5	15	15.5	....

S. O. Ohio Cont'd

KEROSINE PRICES

(Off Statewide Level)

Kerosine prices are off statewide level in the following counties:

Allen, Auglaize, Champaign, Columbiana, Darke, Geauga, Greene, Hardin, Logan, Mahoning, Mercer, Preble, Putnam, Shelby, Trumbull, Union, Van Wert and Wyandot: *12.5

Paulding *12

Ashtabula *11.5

Fayette, Licking, Madison, Pickaway, Portage and Summit *9.5

*Kerosine prices include 1c state tax.

**Commercial consumer t.w. posted price discontinued statewide, Oct. 20, 1937, except in 11 counties, these being: Allen, Auglaize, Champaign, Darke, Logan, Lorain, Mercer, Paulding, Putnam, Shelby and Van Wert.

Commercial Tank Wagon Q.D.A. to contract accounts: Effective Oct. 20, 1937, thru Ohio (except in 23 counties), on monthly purchases, off posted consumer t.w. price: 0 to 999 gals., 1c; 1,000 to 19,999 gals., 1.5c; 20,000 gals. and over, 2.5c. The 23 counties where Q.D.A. differs from statewide are: Allen, Auglaize, Champaign, Darke, Defiance, Erie, Fulton, Hamilton, Henry, Logan, Lorain, Lucas, Meigs, Mercer, Ottawa, Paulding, Putnam, Sandusky, Scioto, Shelby, Van Wert, Williams and Wood.

†This price also to authorized agents, exclusive of 0.5c rental.

Sales tax: Ohio's 3% sales tax, effective Jan. 27, 1935, is added "where assessable, to regular posted prices", S. O. Ohio says.

On kerosine, prices to resellers and commercial consumers are posted generally at 3c per gal. below consumer t.w. price in any quantity, when such prices are on state-wide level.

S. O. Kentucky

CROWN GASOLINE

(Regular Grade)

	Consumer T.W.	All Tax	Total Consumer T.W.	Net Dlr.	Kerosine T.W.
Covington, Ky.	13	6	19	16	11
Lexington, Ky.	13.5	6	19.5	16.5	11
Louisville, Ky.	13	6	19	16	10.5
Paducah, Ky.	13.5	6	19.5	16.5	10
Jackson, Miss.	13	7	20	17	*13
Vicksburg, Miss.	13	7	20	17	*13
Birmingham, Ala.	14	*8	22	19	12
Mobile, Ala.	13	*9	22	19	11
Montgomery, Ala.	13	*9	22	19	*14.5
Atlanta, Ga.	14	7	21	18	*12
Augusta, Ga.	14	7	21	18	*14
Macon, Ga.	14.5	7	21.5	18.5	*14.5
Savannah, Ga.	12	7	19	16	*12
Jacksonville, Fla.	13	7	20	17	10
Miami, Fla.	12.5	8	20.5	17.5	12.5
Pensacola, Fla.	13	*9	22	19	12
Tampa, Fla.	11	8	19	16	10.5

KYSO GASOLINE

(Third Grade)

Covington, Ky.	11	6	17	14.5	....
Lexington, Ky.	11.5	6	17.5	15	....
Louisville, Ky.	11	6	17	14.5	....
Paducah, Ky.	12	6	18	15.5	....
Jackson, Miss.	11.5	7	18.5	16	....
Vicksburg, Miss.	11.5	7	18.5	16	....
Birmingham, Ala.	12	*8	20	17.5	....
Mobile, Ala.	10.5	*9	19.5	17	....
Montgomery, Ala.	10.5	*9	19.5	17	....
Atlanta, Ga.	12	7	19	16.5	....
Augusta, Ga.	12	7	19	16.5	....
Macon, Ga.	12.5	7	19.5	17	....
Savannah, Ga.	9.5	7	16.5	14	....
Pensacola, Fla.	11	*9	20	17.5	....

Discounts to all tank wagon consumers: Effective Jan. 4, 1937, thru territory, on Crown gasoline, 3c per gal. below consumer t.w. price; on Kyso, 2.5c below, regardless of quantity purchased, per month.

Discounts on kerosine: Prices in Kentucky are net, but in other states subject to 2c discount.

**Taxes*: in the tax column is included these city and county gasoline taxes at the following points: Mobile, 2c city; Birmingham, 1c city; Montgomery, 1c city and 1c county; Pensacola, 1c city. Georgia and Mississippi kerosine prices include 1c state tax. Montgomery kerosine price includes 1c city tax.

Above prices include these inspection fees on both gasoline and kerosine, per gallon, figured on basis of 50 gallons per barrel.

Alabama, 1/40c on gasoline. 1/2c on kerosine; Arkansas, 1/5c per gal. in a single barrel. 1/20c per gal. in bulk; Florida, 1/8c; Illinois, 3/100c; Indiana, 1/2c per gal. in a single barrel; 3/10c per gal. in lots of 2 to 10 bbls., 1/5c for 10 to 50 bbls., 2/25c for over 50 bbls.; Kansas, 1/50c, (3/50c can be charged to meet inspection department expenses); Louisiana, 1/32c; Minnesota, 1/25c; Missouri, 3/100c; Nebraska, 3/100c; Nevada, gasoline, 1/20c; North Carolina, 1/4c; North Dakota, 1/20c; Oklahoma, 2/25c per gal., in lots of more than 50 bbls., 1/5c in lots less than 50 bbls.; South Carolina, 1/8c; South Dakota, 1/10c; Tennessee, 2/5c; and Wisconsin, 1/25c.

Kerosine inspection fee only: Iowa, 2/25c; Michigan, 4/5c per gal. for first 2 bbls.; 3/5c for next 3; 2/5c for next 5; 3/10c for next 15, and 1/5c per gal. in lots over 25 bbls

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 15, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

S. O. Indiana

	Red Crown Tax	Dealer Prices Red Crown Total T.W.	Stanolind Cons. T.W.	Kerosine T.W.
Chicago, Ill.	4	15.2	13.2	12	10.1
Decatur, Ill.	4	15.2	13.7	13	10.1
Joliet, Ill.	4	15.2	13.7	13.2	10.1
Peoria, Ill.	4	15.2	13.7	13.2	10.1
Quincy, Ill.	4	15	13.5	12.4	9.9
Indianapolis, Ind.	5	16.9	15.4	14.7	*14.8
Evansville, Ind.	5	16.7	15.2	13	*14.6
South Bend, Ind.	5	17.1	15.6	15.1	*13.6
Detroit, Mich.	4	15.1	13.6	13.1	9.8
Grand Rapids, Mich.	4	16.2	14.7	14.2	10.9
Saginaw, Mich.	4	16	14.5	14	8.5
Green Bay, Wis.	5	16.9	15.4	14.7	10.8
Milwaukee, Wis.	5	16.5	15	14.2	10.4
La Crosse, Wis.	5	16.6	15.1	14.6	10.5
Minneapolis-St. Paul.	5	16.6	15.1	14.6	10.5
Duluth, Minn.	5	17	15.5	15	10.9
Mankato, Minn.	5	16.6	15.1	14.6	10.5
Des Moines, Ia.	4	15	13.5	12	*12.9
Sioux City, Ia.	4	15.2	13.7	13.2	*13.1
Davenport, Ia.	4	15.2	13.7	13.2	*13.1
Mason City, Ia.	4	15.4	13.9	13.4	*13.3
St. Louis, Mo.	*4	14.9	13.4	11.2	9.8
Kansas City, Mo.	*4	14.6	13.1	12.6	8
St. Joseph, Mo.	*4	14.6	12.4	12	8.5
Fargo, N. D.	4	16.6	15.1	14.6	11.5
Minot, N. D.	4	17.8	16.3	15.8	12.7
Huron, S. D.	*5	17	15.5	15	*10.9
Wichita, Kans.	4	14.1	12.4	10.5	8

*Taxes: in the tax column is included these city and state gasoline taxes at following points: Kansas City, St. Joseph and St. Louis, 1c city tax; South Dakota, 0.1c sales tax. State Kerosine taxes: Indiana, 4c; Iowa, 3c, all included in above prices.

Discount to commercial consumers: Effective Jan. 1, 1935, thru territory, except Michigan effective Feb. 1, on purchases per month, discount off t.w. prices; all gasolines, 25 to 1,000 gals., at t.w. price; 1,000 gals., or more, 1.5c off t.w. on Ethyl and Red Crown, and 1c on Stanolind (latter effective June 9, 1937). Minimum delivery is 25 gals.

S. O. Nebraska

STANDARD RED CROWN GASOLINE

	All Tax	T.W. Total	Dealer Total	Kerosine T.W.
Omaha, Neb.	6	17.6	16.1	10.4
McCook	6	18	14	10
Norfolk	6	18	16.5	10.8
North Platte	6	18.4	16.9	11.2
Scottsbluff	6	19.1	15.9	11.9

Discounts to commercial consumers: for tank wagon deliveries covered only by Standard Commercial Consumer Contract, effective January 1, 1935.

S. O. Louisiana

ESSOLENE

	Consumer Tank Car	Dealer T.W.	Taxes	Posted S.S.	Kerosine T.W.
Little Rock, Ark.	7.75	9.25	7.5	**	11.5
Alexandria, La.	7.75	9.25	8	**	*12
Baton Rouge, La.	7.25	9.75	8	21.25	*12
New Orleans, La.	7.25	9.75	*10	23.25	*13
Lake Charles, La.	8.25	10.75	8	**	*12.5
Shreveport, La.	7.5	10	8	**	*9.5
Lafayette, La.	8.25	10.75	8	**	*13
Bristol, Tenn.	10.25	11.5	8	**	14.5
Chattanooga, Tenn.	9.75	12.25	8	**	13.5
Knoxville, Tenn.	10.25	12.75	8	**	14
Memphis, Tenn.	8.25	10.75	8	**	12
Nashville, Tenn.	9.25	11.75	8	**	11.5

*New Orleans gasoline tax includes 7c state, 1c federal, and 2c parish tax. Louisiana kerosine prices include 1c state tax; in addition New Orleans has 1c parish tax.

**S. O. Louisiana transferred stations to dealers; no prices available.

Price basis to dealers: Undivided dealers get dealer price, less 0.5c.

Price basis to commercial consumers: Effective May 15, 1937, thru territory; commercial consumers taking 50 gals. or more at one time will be billed at posted consumer t.w. price; those taking less than 50 gals. at one time will be billed at 4c per gal. over posted consumer t.w. price. Generally, the posted consumer t.w. price will be equivalent to the dealer price less 0.5c per gal.

Humble Oil & Refining Co.

HUMBLE MOTOR FUEL

	*T.W.	*Total Taxes	T.W.	S.S.	Kerosine T.W.
Dallas, Tex.	8.5	5	13.5	17	8
Ft. Worth, Tex.	9	5	14	18	8
Houston, Tex.	9.5	5	14.5	18.5	8
San Antonio, Tex.	9.5	5	14.5	18.5	8

U. S. Motor Gasoline
(Third Grade)

Dallas, Tex.	7	5	12	14	
Ft. Worth, Tex.	7.5	5	12.5	15	
Houston, Tex.	8.5	5	13.5	16.5	
San Antonio, Tex.	8.5	5	13.5	16.5	

*Price is t.w. price to all classes of dealers and consumers.

Price basis to "open" dealers: discount off posted retail price: when posted retail price, including all taxes on Esso motor fuel is: 19.1c per gal. and above, discount is 3.5c; 19c to 18.1c, 3c, and 18c and below, 2.5c. Humble motor fuel, 17.1c and above, 3.5c; 17 to 16.1c, 3c; and 16c and below, 2.5c; U. S. motor fuel, 15.1c and above, 2.5c; 15 to 14.1c 2c; and 14c and below, 1.5c.

Continental Oil

	Conoco Bronze Ex-Tax	All Tax	Dealer Prices Total Conoco Bronze	De-mand	Kerosine T.W.
Denver, Colo.	11.5	5	16.5	15.5	11.5
Grand Junc. Colo.	14	5	19	18	15
Pueblo, Colo.	11	5	16	14	10.5
Casper, Wyo.	12	5	17	16	11.5
Cheyenne, Wyo.	12	5	17	16	13
Billings, Mont.	14	6	21	18	15.5
Butte, Mont.	13.5	6	19.5	16.5	15.5
Great Falls, Mont.	15.5	6	21.5	20.5	15.5
Helena, Mont.	15.5	6	21.5	20.5	15.5
Salt Lake City, Utah.	14.5	5	19.5	16.5	16
Boise, Ida.	15.5	6	21.5	20.5	18
Twin Falls, Ida.	15.5	6	21.5	20.5	18
Albuquerque, N. M.	11	†6.5	17.5	16.5	12
Roswell, N. M.	11	†6.5	17.5	15	10.5
Santa Fe, N. M.	12	*7	19	16.5	12
Muskogee, Okla.	9.5	5	14.5	13	7
Oklahoma City, Okla.	9	5	14	12	8
Tulsa Okla.	9	5	14	11	6
Ft. Smith, Ark.	10.5	5	15.5	13.5	8
Little Rock, Ark.	10.5	7.5	18	15.125	9.5
Texarkana, Ark.	10.5	5	15.5	12.5	8.5

†Includes city tax of 0.5c.
*Includes 1c city tax.

S. O. California

STANDARD GASOLINE

	T.W.	Taxes	Total T.W.	S.S.	Kerosine T.W.
San Francisco, Cal.	13.5	4	17.5	18.5	11.5
Los Angeles, Cal.	13	4	17	18	9
Fresno, Cal.	14.5	4	18.5	19.5	12
Phoenix, Ariz.	15	6	21	22	†16
Reno, Nev.	15	5	20	21	13
Portland, Ore.	14	6	20	21	13.5
Seattle, Wash.	14	6	20	21	13.5
Spokane, Wash.	17	6	23	24	16.5
Tacoma, Wash.	14	6	20	21	13.5

FLIGHT GASOLINE
(Third Grade)

San Francisco, Cal.	12	4	16	17	....
Los Angeles, Cal.	11.5	4	15.5	16.5	....
Fresno, Cal.	13	4	17	18	....
Reno, Nev.	13.5	5	18.5	19.5	....
Phoenix, Ariz.	13.5	6	19.5	20.5	....
Portland, Ore.	12.5	6	18.5	19.5	....
Seattle, Wash.	12.5	6	18.5	19.5	....
Spokane, Wash.	15.5	6	21.5	22.5	....
Tacoma, Wash.	12.5	6	18.5	19.5	....

†Includes 5c state tax.

Discount to dealers: on gasoline, off t.w. price on Standard Ethyl and Standard Gasoline, to 100% dealers, 3c; to split dealers, 2c; on Flight gasoline, both 100% and split dealers, 2c.

On Stanavo Aviation Gasoline, to all classes of dealers, 3c off t.w.

To commercial consumers: off tank wagon price: on single deliveries of 40 gallons and over, Stanavo Aviation, Standard Ethyl and Standard Gasolines, 3c. Flight Gasoline, 2c per gallon. Tank wagon delivery, less than 40 gals., 1c per gal. above posted t.w. price.

On kerosine in tank car, transport truck and trailer delivery, 3c off t.w. price; plant deliveries to jobbers, 2.5c below t.w.

Canada

PRICES OF IMPERIAL OIL LTD.

Per Imperial Gallon, which is 1.2 U. S. Gallons

3-STAR IMPERIAL GASOLINE

	T.W.	Taxes	Total T.W.	Kerosine T.W.
Hamilton, Ont.	16	6	22	17
Toronto, Ont.	16	6	22	17
Brandon, Man.	22.8	7	29.8	22.8
Winnipeg, Man.	20.5	7	27.5	20.7
Regina, Sask.	22.5	7	29.5	22
Saskatoon, Sask.	25.8	7	32.8	24.8
Edmonton, Alta.	22.5	7	29.5	24.2
Calgary, Alta.	20	7	27	21.5
Vancouver, B. C.	16	7	23	23
Montreal, Que.	15	6	21	17.5
St. John, N. B.	16	8	24	18.5
Halifax, N. S.	16	8	24	18.5

Note: Imperial Oil Ltd. has completed transfer of service stations to dealers; no s.s. prices available.

Discounts to undivided dealers, 1c off t.w. price, except Maritime Provinces where undivided dealers pay t.w. price. Divided dealers pay t.w. price, thru territory.

Aviation Gasoline

Following are tank car and/or tank wagon prices of aviation gasoline in principal marketing territories (Stanavo aviation in all territories except Continental Oil and unless otherwise noted). Tax column includes 1c federal tax, and state tax; also municipal taxes as indicated in footnotes. Prices in first four territories do not include state or federal taxes.

S. O. NEW JERSEY

	*Ethyl T.C.	Tank Car	T.W.
Bayonne, N. J.	19.5	9.5	12.5
Baltimore, Md.	....	10	12.5
Washington, D. C.	....	....	13.1
Richmond, Va.	....	....	14.7
Greensboro, N. C.	....	....	15.7
Raleigh, N. C.	....	....	17.6
Charleston, W. Va.	....	....	12.2

*This is Stanavo Ethyl Aviation Gasolin 100 octane number, tank car price.

COLONIAL BEACON OIL CO.

	T.W.
Brooklyn, N. Y.	12.8
Buffalo, N. Y.	14.5
Boston, Mass.	15

S. O. PENNSYLVANIA

Philadelphia, Pa.	13.6
Pittsburgh, Pa.	14.4

S. O. LOUISIANA

New Orleans, La.	13.3
Shreveport, La.	13.6

Prices in above four territories are on a 74 octane grade aviation gasoline except where otherwise noted. An 80 octane product generally brings 0.5c premium and an 87 octane product, 1.5c premium over the 74 octane grade.

Note: S.s. prices in above four territories are generally 6c over t.w. prices. Above t.w. prices are net, with no discounts allowed for quantity purchases. T.w. prices are generally tank car price, plus freight, plus 2.5c per gal.

S. O. OHIO
Thru Ohio

	Consumer T.W.	Tax	Total Consumer T.W.
Stanavo Ethy Aviation:			
73 octane	15.5	5	20.5
80 octane	16.5	5	21.5
87 octane	17.5	5	22.5

Discounts: For delivery on contract to hangar operators and resellers: 2c below consumer posted t.w. price, shown above.

S. O. INDIANA

Chicago, Ill.	14.5	4	18.5
Detroit, Mich.	16	4	20
Milwaukee, Wisc.	14.8	5	19.8
Minneapolis, Minn.	14.9	5	19.9
St. Louis, Mo.	14.2	*3	17.2
Kansas City, Mo.	13.9	*4	17.9
Fargo, N. D.	15.9	4	19.9
Huron, S. D.	15.3	5	20.3

*Includes 1c city tax.
**Includes 0.1c to cover.

HUMBLE OIL & REFINING CO.

	Tank Car
Baytown, Tex. (exclusive of taxes)	8.5

CONTINENTAL OIL CO.

	Dealer	Tax	Total Dealer
Denver, Colo.	14.5	5	19.5
Cheyenne, Wyo.	15	5	20
Helena, Mont.	18.5	6	24.5
Salt Lake City, Utah.	17.5	5	22.5
Albuquerque, N. M.	14	*6.5	20.5

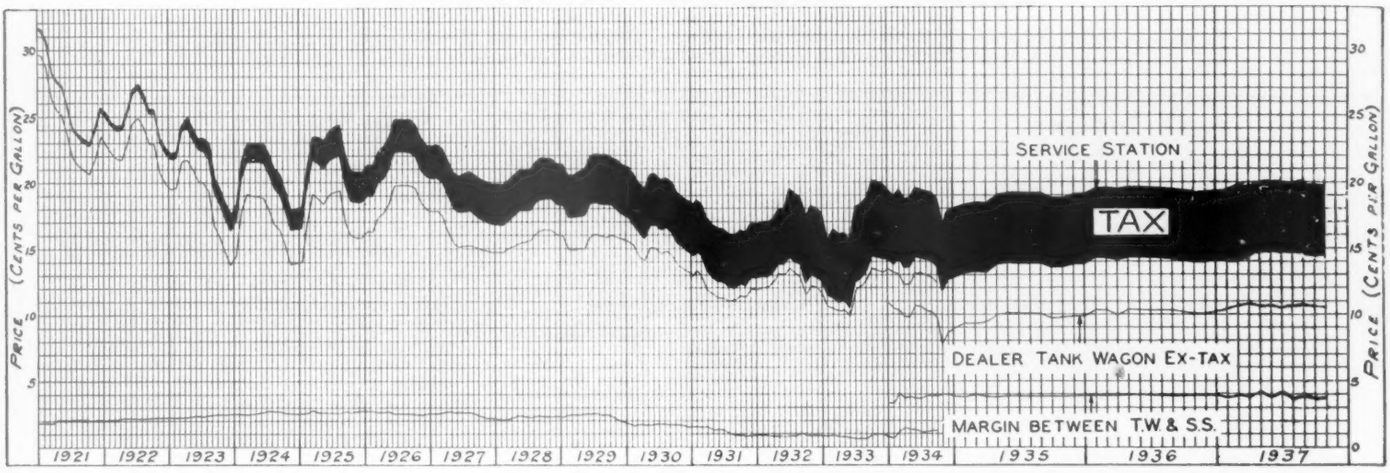
*Includes city tax of 0.5c.

S. O. CALIFORNIA

Phoenix, Ariz.	17	6	23
Los Angeles, Cal.	15	4	19
San Francisco, Cal.	15.5	4	19.5
Reno, Nev.	17	5	22
Portland, Ore.	16	6	22
Seattle, Wash.	16	6	22
Spokane, Wash.	19	6	25

Note: For discounts, etc., see note under Standard and Flight gasoline above.

Trend of Gasoline Prices and Gasoline Taxes, at 50 Representative Cities



Mid-Western

(*Continued from page 56*)

and 5.125-5.25 cents for high octane grades. As prices continued to recede, and tank wagon prices dropped, many traders said they looked for "a reduction in crude prices to complete the market cycle."

Offerings of gasoline in the open market last week continued to exceed jobber takings, resulting in price shading which became more widespread as the week progressed.

At the close of the week there were reports that high octane gasoline was available as low as 4.75 cents. Majority of quotations, however, ranged upward from 5 cents for this grade.

Pick-up in demand for Michigan straight run gasoline, coupled with the fact that refiners were said to be cutting for a lower end point and thereby reducing the gasoline yield, have resulted in some improvement in the market for this product, although no price advances were noted.

Kerosine commanded a good deal of trade attention last week, and prices ruled firm, despite only a spotty movement of kerosine, as such, in the open market. Interest in this product was a reflection of the tightness of the market for good grades of No. 1 distillate and range oil.

TANK WAGON MARKETS

Tax column includes 1c federal tax, state gasoline tax, also city and county taxes as indicated in footnotes, and inspection fees, as shown in general footnote. These prices in effect Nov. 15, 1937, as posted by principal marketing companies at their headquarters offices, but subject to later corrections

Naphtha (In Tank Wagon)

S. O. NEW JERSEY

Posted Tank Wagon Prices

	Mineral Spirits	V.M.&P.
Newark, N. J.	11.5	13.5
Baltimore, Md.	15.5	....
Washington, D. C.	15	....

Discounts: Buyers taking following quantities, at one time, get these discounts: Newark, 2c per gal. on 200 gals. or more; less than 200 gals., 0.5c higher price. Baltimore 2c off on 25 to 100 gals. and 3c on over 100 gals. Washington, 2c off to contract buyers.

SOCONY-VACUUM OIL CO.

Buffalo, N. Y.	13	14
New York City	10.5	11.5
Rochester, N. Y.	13	15
Syracuse, N. Y.	14	15
Boston, Mass.	13.5	14
Bridgeport, Conn.	12.5	14
Hartford, Conn.	12	13.5
Providence, R. I.	13.5	14.5

ATLANTIC REFINING CO.

Philadelphia, Pa.	11.5	12.5
Lancaster, Pa.	13	14
Pittsburgh, Pa.	12.5	14.5

Note: Prices for Mineral Spirits also apply to Stoddard Solvent; and prices for V.M.&P. Naphtha apply also to Light Cleaners Naphtha.

S. O. OHIO

	S.R. Solvent	V.M.&P. Naphtha
Thru Ohio	13.25	13.75

Note: V.M.&P. Naphtha prices also apply on Dry Cleaners naphtha and special Varnolene; Varnolene and Sohio Solvent 0.5c below these prices. Discounts to contract consumers, off t.w. price: 300 to 999 gals., 0.5c; 1,000 to 2,499 gals., 0.75c; 2,500 to 4,999 gals., 1c; 5,000 or more gals., 1.5c.

S. O. INDIANA

(Prices include state and federal taxes)

	Oleum Spirits	V.M.&P. Naphtha	Stanisol
Chicago, Ill.	15.8	16.1	15.5
Detroit, Mich.	19.2	18.2	19.3
Kansas City, Mo.	14.4	15.4	14.4
St. Louis, Mo.	14.7	15.7	14.6
Milwaukee, Wis.	19.3	20.3	19.3
Minneapolis, Minn.	19.4	20.4	18

Note: Prices for V. M. & P. apply also to Light Cleaners Naphtha. All prices, with exception of Missouri points, include state tax. Prices shown are base prices, before discounts.

Naphtha (In Tank Cars)

In Tank Cars (F. o. b. refinery or seaboard terminal except Ohio, delivered price.)

	V.M.&P. Naphtha	Solvent
Baltimore	11	10
New York Harbor	10.5-11	9.00-9.5
Philadelphia district	11	10
Boston	10.5	10
Providence	10.5	10
Ohio points, delivered	9.75	*9.25

*This is on S.R. solvent.

Note: In Ohio, prices on D.C. naphtha and special Varnolene are same as V.M.&P.; on Varnolene and Sohio Solvent, prices are 0.5c less than on V.M.&P.

Latest Changes

From Nov. 9 to Nov. 15 inclusive. Dates and amounts of changes shown. See table for full current prices.

S. O. New Jersey—Essolene:
Cut 0.75c, thru territory, Nov. 15, except Washington unchanged and dealer t. w. at Wheeling.

S. O. Kentucky—Kyso:
Covington, Lexington and Louisville, cut 0.5c, Nov. 9.

S. O. Louisiana—Essolene:
Cut 0.75c, thru territory, Nov. 15.

Corrections

Notation of amount of change and dates not previously shown in table. Table in this issue is corrected to show these changes.

S. O. Kentucky—Crown:
The following exceptions took place in general 0.5c cut thru Kentucky on Nov. 4: Covington unchanged but cut 0.5c Nov. 3; Louisville cut 1c instead of 0.5c; Birmingham, up 2c, Nov. 8.

Kyso:
Covington, cut 0.5c, Nov. 3.
Lexington, cut 0.25c, Nov. 4.
Louisville, cut 0.5c, Nov. 4.
Birmingham, up 1.5c, Nov. 8.

S. O. Indiana—Red Crown:
Quincy, dealer price cut 0.3c, Nov. 3.

Stanolind:
Des Moines, dealer price cut 0.4c, Nov. 3

Kerosine:
St. Joseph, cut 0.5c, Nov. 4.

Humble Oil & Refining — Humble Motor Fuel:
San Antonio, t. w. up 1c, s. s. up 1.5c, Oct. 1.
Ft. Worth, t. w. up 0.5c, s. s. up 1c, Nov. 8.

U. S. Motor Fuel:
San Antonio, t. w. up 1.5c, s. s. up 2.5c, Oct. 1.
Ft. Worth, t. w. up 0.5c, s. s. up 1c, Nov. 8.

Continental Oil—Conoco and Demand:
For general cut of 1c, Nov. 8, see page 23, Nov. 10th issue.

Aviation Gasoline

Continental Oil:
Denver and Cheyenne, cut 1c, Nov. 8.

SEABOARD MARKETS, EXPORT AND COASTWISE

All prices on this page are publisher's opinion of open market quotations or sales, for spot shipment (10 to 15 days). In cargo markets, spot shipment is 90 days. Prices in cents per gallon, except heavy fuel oil in dollars per barrel, in tank car lots, f.o.b. refineries or seaboard terminals in districts designated, unless otherwise noted. Federal, state or municipal taxes not included. Prices quoted apply on products made from legally produced crude.

Eastern Domestic

(Inter-refinery and export prices not included.)

MOTOR GASOLINE

Prices Effective	Nov. 15	
District:	*60-64 Oct.	*65 Oct. & Above
N. Y. harbor	7.00 – 7.25	7.25 – 7.50
†N. Y. harbor	6.75 – 7.00	7.00 – 7.25
Philadelphia	7.00 – 7.25	7.25 – 7.50
Baltimore	7.00 – 7.25	7.25 – 7.50
Norfolk	7.25 – 7.50	7.50 – 7.75
Wilmington, N. C.	7.25 – 7.50	7.50 – 7.75
Charleston, S. C.	7.25 – 7.50	7.50 – 7.75
Savannah	7.25	7.50
Jacksonville	7.25	7.50
Portland	7.75	8.00
Boston	7.00 – 7.25	7.25 – 7.50
Providence	7.00 – 7.25	7.25 – 7.50

*Prices are nominal. †Barge lots.

WATER WHITE KEROSINE

District:			
N. Y. harbor	6.25	Charleston	6.00–6.25
*N. Y. harbor	6.125	Savannah	5.75
Philadelphia	6.25	Jacksonville	5.75
Baltimore	6.25	Portland	6.75
Norfolk	6.00–6.25	Boston	6.40
Wilmington, N. C.	6.25	Providence	6.40

*Barge lots.

†FUEL OILS

	N. Y. harb.	N. Y. harb. barges
No. 1	6.25	6.125
Nos. 2-3	5.25	5.125
No. 4	5.25	5.00 – 5.125
No. 5	$1.45 –$1.55	.....
No. 6	$1.25	.....

	Phila. dist.	Balt. dist.
No. 1	6.25	6.25
Nos. 2-3	5.25	5.25
No. 4	4.75 – 5.25	5.25
No. 5	$1.45–$1.475	$1.45–$1.55
No. 6	$1.25	$1.25

	Bost. dist.	Prov. dist.
No. 1	6.40	6.40
Nos. 2-3	5.40	5.40
No. 4	5.40	5.40
No. 5	$1.45–$1.55	.....
No. 6	$1.25	.....

†Fuel oils meet specifications of U. S. Commercial Standards CS12-35.

District:	†Bunker C Fuel	†Diesel Oil
N. Y. harbor	***$1.25	**$2.20
Philadelphia	***$1.25	***$2.10–2.20
Baltimore	***$1.25	**$2.20
Norfolk	*$1.25	$2.20
Charleston	*$1.20	$2.20
Savannah	*$1.20	$2.20
Jacksonville	*$1.20	$2.20
Tampa	*$1.20	$2.20
Portland	$1.35	$2.35
Boston	***$1.25	**$2.20
Providence	$1.25	$2.25

†In ships' bunkers.
*For barging add 5c per bbl.
**For barging add 6.5c to 7.5c per bbl.
***For barging add 5c to 6c per bbl.

	Gas Oil 28-34 Gravity	Diesel Oil Shore Plants
N. Y. harbor	5.25	5.25
Philadelphia dist.	5.00	....
Baltimore dist.	5.25	....
Norfolk dist.	5.25	....
Savannah dist.	....	5.25
Jacksonville dist.	....	5.25

Pacific Export

(Quotations are at seaboard, Los Angeles, in cargo lots, cents per gal., except where otherwise noted.)

Prices Effective	Nov. 15	Nov. 8
U. S. Motor, under 65 oct.	6.00 – 6.125	6.00 – 6.125
400 e.p. blend 65 oct. & above	6.125– 6.375	6.125– 6.375
*38-40 w.w. kerosine	4.75 – 5.00	4.75 – 5.00
41-43 w.w. kerosine	5.00 – 5.50	5.00 – 5.50
44 w.w. kerosine	5.50 – 5.75	5.50 – 5.75

*150 fire point.

Prices Effective	Nov. 15	Nov. 8
In Cargo lots, per bbl.		
Diesel fuel, 24° & above	$1.45 –$1.50	$1.45 –$1.50
Diesel fuel, under 24°	$1.40 –$1.45	$1.40 –$1.45
*30-34 diesel (gas oil)	$1.55 –$1.65	$1.55 –$1.65
†Grade C fuel oil	$0.85 –$0.90	$0.90

Note: For San Francisco cargo prices, add 5c per bbl. to above cargo prices.

In Ships' Bunkers, or deep tank lots, per bbl.:		
*Diesel fuel oil	$1.625–$1.65	$1.625–$1.65
†Grade C fuel oil	$1.075–$1.10	$1.075–$1.10

*Pacific specification 200. †Pacific specification 400.

Cased Goods: (Per case)			
U. S. Motor	$1.45	$1.575	$1.45 –$1.575
400 e.p. blend, 65 oct. & above	$1.55	–$1.675	$1.55 –$1.675
*40-43 w.w. kerosine	$1.25	–$1.325	$1.25 –$1.325
Kerosine, p.w.	$1.20	–$1.30	$1.20 –$1.30

*150 fire point.

New York Export

(Prices in cents per gal. in bbls. F.a.s. New York)

CYLINDER OILS (Pennsylvania Products)

Bright stock:			
Light, 25 p.t.	23.50	–24.00	23.50 –24.00
Dark, 25 p.t.	23.00	–23.50	23.00 –23.50
Neutral oil:			
200 3 color, 25 p.t.	30.00	–30.50	30.00 –30.50
150 3 color, 25 p.t.	25.50	–26.00	25.50 –26.00
600 Warren E filtered	21.50	–22.00	21.50 –22.00
600 s.r., unfiltered	15.50	–16.50	16.50 –17.00
650 s.r., unfiltered	20.00		20.00 –20.50
600 fl., s.r.	20.50	–21.00	21.50 –22.00
630 fl., s.r.	23.50	–24.00	24.50 –25.00

Wax, Domestic *and* Export

(Prices in cents per lb. Tests made by A. S. T. M. methods. Melting points shown below, however, are A. M. P., 3° higher than A. S. T. M. (E. M. P.) melting points. Export prices are f.a.s. carload lots. Domestic prices are f.o.b. refineries in New York and New Orleans districts, in bags, carload lots, with 0.2c discount allowed for shipment in bulk. Scale, solid and fully refined, slabs in bags.)

Prices Effective	Nov. 15	
	New York	
	Domestic	Export
124-6 Y.C. scale	2.80 – 2.85	2.80 – 2.85
122-4 W.C. scale	2.85 – 2.95	2.85 – 2.95
124-6 W.C. scale	2.85 – 2.95	2.85 – 2.95
123-5 Fully rfd.	4.45	4.125– 4.375
125-7 Fully rfd.	4.55	4.25 – 4.375
128-30 Fully rfd.	4.80	4.50 – 4.625
130-2 Fully rfd.	4.95	4.75 – 5.00
133-5 Fully rfd.	†5.35	5.25 – 5.375
135-7 Fully rfd.	†5.60	5.50 – 5.75
	New Orleans	
	Domestic	Export
124-6 Y.C. scale	2.80 – 2.85	2.80 – 2.85
122-4 W.C. scale	*2.85 – 2.95	*2.85 – 2.95
124-6 W.C. scale	*2.85 – 2.95	*2.85 – 2.95
123-5 Fully rfd.	4.45	4.125– 4.375
125-7 Fully rfd.	4.55	4.25 – 4.375
128-30 Fully rfd.	4.80	4.50 – 4.625
130-2 Fully rfd.	4.95	4.75 – 5.00
133-5 Fully rfd.	†5.35	5.25 – 5.375

†Shipment either in bags or in bulk

*Corrections: This price in effect Nov. 8th instead of prices published on page 65, Nov. 10th issue.

Gulf Coast

(Prices are f.o.b. ship at Gulf oil terminals representing opinions of traders, except prices specified to the contrary. Prices cover bulk shipments of 20,000 bbls. or more, unless otherwise noted.)

Prices Effective	Nov. 15	Nov. 8
For Domestic shipment:		
MOTOR GASOLINE		
59 oct. & below	*5.50 – 5.625	*5.75 – 5.875
60-64 oct. number	*5.625– 5.75	*5.875– 6.00
65 oct. & above	5.875– 6.125	6.125– 6.25
FUEL OILS		
No. 1	5.25 – 5.375	5.25 – 5.375
No. 2	4.50 – 4.625	4.50 – 4.625
No. 4	4.375– 4.50	4.375– 4.50
KEROSINE		
41-43 w.w.	5.25 – 5.375	5.25 – 5.375
For Export Shipment:		
GASOLINE		
U. S. Motor	5.50 – 5.625	5.75 – 5.875
60-62, 400 e.p.	5.50 – 5.625	5.875– 6.00
61-63, 390 e.p.	5.625– 5.75	5.875– 6.00
64-66, 375 e.p.	5.625– 5.75	6.00 – 6.125

*Nominal.

Prices Effective	Nov. 15	Nov. 8
KEROSINE		
44 w.w.	*5.625	*5.625
41-43 w.w.	5.25 – 5.375	5.25 – 5.375
41-43 p.w.	5.125– 5.25	5.125– 5.25
GAS AND BUNKER OILS		
For Domestic and/or Export Shipment		
‡26-30 translucent gas oil	4.375– 4.50	4.375– 4.50
‡30 plus translucent gas oil	4.50 – 4.625	4.50 – 4.625
‡30 plus transparent gas oil	4.50 – 4.625	4.50 – 4.625
Diesel Oil Ship's bkrs.	†$1.90	†$1.90
Grade C bunker oil, for ship's bunkers	†$0.95	†$0.95
Grade C bunker oil, in cargoes	$0.85	$0.85

‡Less than ½ of 1% sulphur. †Barging 5c bbl. additional at some Gulf ports.

*Correction: This price correct for Nov. 1.

MEXICAN CRUDE AND BUNKER OILS

(F.o.b. Steamer, Tampico)

Heavy Panuco crude, taxes to be paid	*$0.96	†*$0.96
Grade C bunker oil, ship's bunkers, taxes paid	$1.00	$1.00

†Correction: This price correct for Nov. 8.

MID-CONTINENT LUBRICATING OILS

(Prices in cents per gal. in bbls. f.a.s. Gulf oil terminals In drums and new barrels, 0.5c to 1c higher per gal. in some instances.)

190-200 vis. D 210 brt. stock	25.50	25.50
150-160 vis. D 210 brt. stock:		
0-10 p.p.	22.50	22.50
10-25 p.p.	21.50	21.50
25-40 p.p.	21.50	21.50
150-160 vis. E 210 brt. stock	21.50	21.50
120 vis. D 210 brt. stock	20.50	20.50
180 vis. No. 3 color neutral:		
0-10 p.p.	16.50	16.50
15-30 p.p.	16.00	16.00
200 vis. No. 3 color neutral:		
0-10 p.p.	17.00	17.00
15-30 p.p.	16.50	16.50
600 s.r. olive green	12.50	12.50
600 s.r. dark green	10.50	10.50
631 s.r.	20.50	20.50

SOUTH TEXAS LUBRICATING OILS

(Vis. at 100° F., pour point 0. Tanker, f.o.b. Gulf oil terminals, for export shipment.)

Unfiltered Pale Oils:			
Vis.	Color		
100	No. 3	5.50 – 5.75	5.50 – 5.75
200	No. 3	7.25 – 7.50	7.25 – 7.50
300	No. 3	7.75 – 8.00	7.75 – 8.00
500	No. 3½	8.75 – 9.00	8.75 – 9.00
750	No. 4	9.25 – 9.50	9.25 – 9.50
1200	No. 4	9.75 –10.00	9.75 –10.00
2000	No. 4	10.25 –10.50	10.25 –10.50
Red Oils:			
Vis.	Color		
100	No. 5-6	5.50 – 5.75	5.50 – 5.75
200	No. 5-6	7.25 – 7.50	7.25 – 7.50
300	No. 5-6	7.75 – 8.00	7.75 – 8.00
500	No. 5-6	8.75 – 9.00	8.75 – 9.00
750	No. 5-6	9.25 – 9.50	9.25 – 9.50
1200	No. 5-6	9.75 –10.00	9.75 –10.00
2000	No. 5-6	10.25 –10.50	10.25 –10.50

Note: Red oil prices shown above cover oils with green cast; prices for blue cast red oils are slightly lower in some cases.

Tanker Rates

(Approximate tanker freight rates to Continental ports, in shillings per ton of 2240 lbs., British sterling; to U. S. ports in cents per bbl.)

Rates Effective	Nov. 15			
	Crude &/or Fuel		Refined Oil &/or Spirits	
	Last Paid	Owners Ask	Last Paid	Owners Ask
Gulf-U.K./Cont.‡	19/	19/9-20/6	21/6	22/3-23/
Aruba-U.K./Cont.‡	16/6	17/6-18/	19/	20/-21/
Gulf-N. Atlantic** (not E. of N. Y.):				
Hvy. Crude & Fuel, (10 to 19.9 gravity)	29c	29c	....	....
Light Crude, (30 Grav. or Lighter)	25c	25c	....	....
Gasoline	....	....	25c	25c-26c
Kerosine	....	....	26c	26c-27c
Light Fuel	....	....	27c	27c-28c

Note: Dirty boat quotations are enlarged to cover, "Fuel and Light Crude" quotations.

‡Continental ports in range between Bordeaux and Hamburg, both inclusive.

**Venezuela loading same rate; Tampico 2c to 3c per bbl. additional.

CRUDE OIL MARKETS

Prices in $ per bbl. of 42 U. S. gals. at the well. A. P. I. gravity. Prices are effective as of 7 a. m. of dates as given

EASTERN FIELDS

Posted by Joseph Seep Purchasing Agency

(Effective Oct. 12, 1937, except Corning Sept. 2, 1937)

Penna Grade Oil in Southwest Penna. Pipe Lines $2.05
Penna. Grade Oil in Eureka Pipe Lines (West Virginia) $2.00
Penna. Grade Oil in Buckeye Pipe Lines (Macksburg, O.) $1.85
Corning Oil in Buckeye Pipe Lines (Ohio) ... $1.27

Posted by Other Companies

Tide Water Pipe Co., Ltd.
Bradford-Allegany district (Penna. and N. Y.) (Effective Oct. 12, 1937) $2.35
*The Pennzoil Co.: (Effective Oct. 12, 1937)
Penna. Grade Oil in National Transit Lines *$2.35
Ashland Oil & Transportation Co.:
Somerset Oil in Ashland Lines (Ky.):
(Effective Jan. 28, 1937)
Big Sandy River $1.42
Kentucky River $1.50

*The Pennzoil Co. posts $2.35 in Cochran, Franklin, Hamilton and Doolittle, Pa. fields; prices in other lower districts range down to $2.30 per bbl. at well.

MICHIGAN

Posted by Pure Oil Co.

Midland, Midland County (July 23, 1937) ... $1.27

Posted by Simrall Pipe Line Corp.

(Effective July 22, 1937)
West Branch, Arenac, and equal grades $1.09
(Effective July 23, 1937)
Beaverton, Crystal, Greendale, Porter and equal grades $1.27
Buckeye $1.245
(Effective July 1, 1937)
Billings and Tobacco $1.395

CENTRAL STATES FIELDS

Posted by Ohio Oil Co.

(Effective Jan. 28, 1937)
Illinois, Princeton $1.35
Lima $1.25
Owensboro (Western Ky.) $1.40

Posted by Stoll Oil Refining Co.

(Effective Feb. 1, 1937)
Stoll Pipe Line Oil (Ky.) $1.40

CANADIAN FIELDS

Posted by Imperial Oil Limited

Western Ontario

(Effective Sept. 9, 1933)
Petrolia $2.10
Oil Springs $2.17

Alberta—Turner Valley

(Prices f.o.b. field tankage)
(Effective Sept. 1, 1937)
Clear Naphtha, 65 grav. & above $2.36

Crude Oil & Discolored Naphtha

40-40.9°	$1.36	53-53.9	$1.62
41-41.9	1.38	54-54.9	1.64
42-42.9	1.40	55-55.9	1.66
43-43.9	1.42	56-56.9	1.68
44-44.9	1.44	57-57.9	1.70
45-45.9	1.46	58-58.9	1.72
46-46.9	1.48	59-59.9	1.74
47-47.9	1.50	60-60.9	1.76
48-48.9	1.52	61-61.9	1.78
49-49.9	1.54	62-62.9	1.80
50-50.9	1.56	63-63.9	1.82
51-51.9	1.58	64-64.9	1.84
52-52.9	1.60	65° & higher, for discolored naphtha only	2.36

Note: Clear naphtha: 22 color; 10 lbs. vapor pressure, Reid method; 90% recovery; end point, 410°. Discolored naphtha: same specifications as for clear naphtha except color.

MID-CONTINENT

Posted by Stanolind Crude Oil Purchasing Co., Jan. 28, 1937

	(In Oklahoma-*Kansas)	(In North-North Central Texas)
Below 29	$1.06	$0.96
29-29.9	1.08	0.98
30-30.9	1.10	1.00
31-31.9	1.12	1.02
32-32.9	1.14	1.04
33-33.9	1.16	1.06
34-34.9	1.18	1.08
35-35.9	1.20	1.10
36-36.9	1.22	1.12
37-37.9	1.24	1.14
38-38.9	1.26	1.16
39-39.9	1.28	1.18
40 & above	1.30	1.20

Above Stanolind prices met as follows:

Jan. 28, Continental Oil Co. met in Okla., Kans., and North Texas. Sinclair-Prairie met in North Texas and North Central Texas, Jan. 28, Stanolind's North Texas schedule. Same date, The Texas Co. met in North-North Central Texas.

Note: Stanolind prices in Okla.-Kans. are for quantities computed by 97% tank tables. In Texas, 100% tank tables are used effective Oct. 1, 1937, volume corrected to 60° F., and deduction for full b.s. & w. content.

*Effective Aug. 1, 1937, for Otis-Albert pools Rush-Barton counties, Kans., 13c less.

Posted by Carter Oil Co.

In Oklahoma

(Effective Jan. 28, 1937)

Below 25	$0.98	33-33.9	$1.16
25-25.9	1.00	34-34.9	1.18
26-26.9	1.02	35-35.9	1.20
27-27.9	1.04	36-36.9	1.22
28-28.9	1.06	37-37.9	1.24
29-29.9	1.08	38-38.9	1.26
30-30.9	1.10	39-39.9	1.28
31-31.9	1.12	40 and above	1.30
32-32.9	1.14		

Above Carter schedule met Jan. 28 by the following companies: Sinclair-Prairie, Shell and Barnsdall in Oklahoma-Kansas; Skelly Oil in Kansas; Tide Water in Oklahoma; Pure Oil in Oklahoma-Kansas, beginning with below 24 at $0.98 and ending with 40 & above at $1.30.

Posted by Magnolia Petroleum Co.

(Effective Jan. 28, 1937)

In Oklahoma, same schedule as Carter Oil, which see above, beginning with below 25, at $0.98 and ending with 40 & above, at $1.30.

In Texas: North and North Central, including Burkburnett, Archer, Henrietta, Electra, Comanche and Olden, same gravity and price schedule as Stanolind in North Texas, which see under Stanolind, beginning with below 29 at $0.96 and ending with 40 and above, at $1.20.

Beaumont, Tex.

(Effective Oct. 1, 1937)

Below 21°	$0.95	27-27.9	$1.15
21-21.9	0.98	28-28.9	1.17
22-22.9	1.01	29-29.9	1.19
23-23.9	1.04	30-30.9	1.21
24-24.9	1.07	31-31.9	1.23
25-25.9	1.10	32-32.9	1.25
26-26.9	1.13	33-33.9	1.27
		34 & above	1.29

TEXAS FIELDS

Posted by Humble Oil & Refining Co.

(**West Central Texas*)

(Effective Jan. 28, 1937)

Below 29	$0.96	35-35.9	$1.10
29-29.9	0.98	36-36.9	1.12
30-30.9	1.00	37-37.9	1.14
31-31.9	1.02	38-38.9	1.16
32-32.9	1.04	39-39.9	1.18
33-33.9	1.06	40 and above	1.20
34-34.9	1.08		

*Includes Brown, Callahan, Coleman, Comanche, Eastland, Fisher, Haskell, Jones, Shackelford, Stephens, Throckmorton and Young counties.

Shell Petroleum Corp., effective Jan. 28, posts Humble's above schedule on Fisher county crude, plus these five lower grades, beginning with below 25 gravity at $0.88; 25-25.9, $0.90; 26-26.9, $0.92; 27-27.9, $0.94, and 28-28.9, $0.96; rest of schedule same as Humble's in West Central Texas.

Note: Effective Oct. 1, 1937, Humble prices are based on 100% tank tables at 60F.

(**East Central Texas*)

(Effective Jan. 28, 1937)

Below 29	$1.03	35-35.9	$1.17
29-29.9	1.05	36-36.9	1.19
30-30.9	1.07	37-37.9	1.21
31-31.9	1.09	38-38.9	1.23
32-32.9	1.11	39-39.9	1.25
33-33.9	1.13	40 and above	1.27
34-34.9	1.15		

*Including Anderson, Cherokee, Limestone, Navarro counties.

Same date, Sinclair-Prairie met in Mexia Humble's above schedule.

PANHANDLE TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

	Gray County	Carson-Hutchinson
Below 35	$0.96	$0.91
35-35.9	0.98	0.93
36-36.9	1.00	0.95
37-37.9	1.02	0.97
38-38.9	1.04	0.99
39-39.9	1.06	1.01
40 & above	1.08	1.03

Jan. 28, above prices met by Sinclair-Prairie and Magnolia in the entire area and by Continental in Carson-Hutchinson and by Texas Co. in Panhandle Sweet, same as Humble's Gray Co. and on Panhandle Sour, same as Carson-Hutchinson.

EAST TEXAS

(Effective May 22, 1937)
Stanolind, Humble, Shell, Sinclair-Prairie, Texas Co., and Magnolia $1.35

Shell also posted on Jan. 28, in Livingston area, Polk County, Texas, $1.27.

NORTHEAST TEXAS

(Posted by Humble, Jan. 28, 1937)

Talco $0.78

(Posted by Magnolia, Jan. 28, 1937)

Cass County and Panola County, Tex:
Same gravity and price schedule as S. O. Louisiana posts for Rodessa, La., which see under that company.

(Posted by The Texas Co., Jan. 28, 1937)

Cass County $1.25

WEST TEXAS AND NEW MEXICO

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

(Including Andrews, Crane, Crockett, Ector, Glasscock, Howard, Winkler and Upton Counties, Texas and Lea county, New Mexico).

Below 26	$0.78	33-33.9	$0.94
26-26.9	0.80	34-34.9	0.96
27-27.9	0.82	35-35.9	0.98
28-28.9	0.84	36-36.9	1.00
29-29.9	0.86	37-37.9	1.02
30-30.9	0.88	38-38.9	1.04
31-31.9	0.90	39-39.9	1.06
32-32.9	0.92	40 & above	1.08
Pecos, West Texas			$0.91

Jan. 28, Magnolia met Humble in Crane, Upton, Howard, Glasscock, Mitchell and Winker.

Shell Petroleum Corp., on Jan. 28, met Humble in Crane, Glasscock, Howard, Pecos (except Yates shallow pool), Winkler, and Upton counties, Tex., and in Lea County, N. Mex. On Jan. 28, Shell posted in Yates shallow pool in Pecos county, Tex., $0.81. June 4, 1937, Shell added Ector county to West Texas postings.

Jan. 28, Stanolind Oil & Gas Co. met Humble in Hendrick field, Winkler county.

Jan. 28, Texas Co. met Humble in Ward and Winkler counties, Tex., and Lea County, N. M.

April 20, 1937, Sinclair Prairie met Humble in Ward and Winkler, Tex. and Lea, N. M., counties, except that its gravity schedule ends with 36 and above, at $1.00.

Posted by Continental Oil Co.

(Effective Jan. 28, 1937)

Artesia, Jackson and Maljamar pools, N. M. ... $0.90

COLORADO

(Posted by Continental Oil Co.,

Effective Jan. 28, 1937)

Ft. Collins and Wellington

Below 29	$1.01	35-35.9	$1.15
29-29.9	1.03	36-36.9	1.17
30-30.9	1.05	37-37.9	1.19
31-31.9	1.07	38-38.9	1.21
32-32.9	1.09	39-39.9	1.23
33-33.9	1.11	40 & above	1.25
34-34.9	1.13		

Cannon City and Florence, Col. $1.10

SOUTH AND SOUTHWEST TEXAS

Posted by Humble Oil & Refining Co.

(Effective Jan. 28, 1937)

Carroll, Clark, Darst Creek, Hilbig, Salt Flat and Zoboroski fields $1.09

Pettus	$1.37	Van Zandt	$1.10

(Effective Nov. 1, 1936)

Heyser heavy	$0.90	Placedo heavy	$0.90
Heyser light	1.15	Taft	0.95

Shell Pet. Corp. on Jan. 28, posted $1.09 in Salt Flat district, Tex.

Anahuac, Dickinson, Flour Bluff and Turtlebay

(Effective Jan. 28, 1937)

Below 31	$1.16	36-36.9	$1.28
31-31.9	1.18	37-37.9	1.30
32-32.9	1.20	38-38.9	1.32
33-33.9	1.22	39-39.9	1.34
34-34.9	1.24	40 and above	1.36
35-35.9	1.26		

Jan. 28, Magnolia met Humble in Darst Creek; posted $1.00 in Luling; $1.12 in Lytton Springs; $1.27 for Cleveland, Liberty county, Tex.; $1.15 in Hardin, Liberty county, Tex.

Jan. 28, 1937, The Texas Co. met Humble in Darst Creek.

Posted by Humble

Conroe, Raccoon Bend, Tomball and Satsuma

(Deep sand crudes)

(Effective Jan. 28, 1937)

Below 29	$1.20	35-35.9	$1.34
29-29.9	1.22	36-36.9	1.36
30-30.9	1.24	37-37.9	1.38
31-31.9	1.26	38-38.9	1.40
32-32.9	1.28	39-39.9	1.42
33-33.9	1.30	40 & above	1.44
34-34.9	1.32		

Jan. 28, Magnolia met Humble in Tomball and Texas Co. met Humble in Conroe, beginning with $35-35.9 gravity.

Posted by Humble

Mirando, Heavy and Light

(Effective July 6, 1937)

Below 21	$0.96	31-31.9	$1.18
21-21.9	0.98	32-32.9	1.20
22-22.9	1.00	33-33.9	1.22
23-23.9	1.02	34-34.9	1.24
24-24.9	1.04	35-35.9	1.26
25-25.9	1.06	36-36.9	1.28
26-26.9	1.08	37-37.9	1.30
27-27.9	1.10	38-38.9	1.32
28-28.9	1.12	39-39.9	1.34
29-29.9	1.14	40 & above	1.36
30-30.9	1.16		

July 6, Magnolia posted same schedule as Humble in Mirando.

July 6, 1937, Texas Co. posted for Duval-Mirando, $0.96 for below 21, plus 2c differential, to $1.12 for 28 & above.

(Continued on next page)

CRUDE OIL MARKETS

(Continued from preceding page)

NORTH LOUISIANA-ARKANSAS

Posted by Standard Oil Co. of Louisiana

(Effective Jan. 28, 1937)

(In Caddo, Homer, Haynesville, Sabine, De Soto, Sarepta, Carterville, El Dorado, Bunkie, and Miller county).

Below 25	$0.90	33-33.9	$1.08
25-25.9	0.92	34-34.9	1.10
26-26.9	0.94	35-35.9	1.12
27-27.9	0.96	36-36.9	1.14
28-28.9	0.98	37-37.9	1.16
29-29.9	1.00	38-38.9	1.18
30-30.9	1.02	39-39.9	1.20
31-31.9	1.04	40 and above	1.22
32-32.9	1.06		

Rodessa, La.

(Effective Jan. 28, 1937)

Below 25	$0.93	33-33.9	$1.11
25-25.9	0.95	34-34.9	1.13
26-26.9	0.97	35-35.9	1.15
27-27.9	0.99	36-36.9	1.17
28-28.9	1.01	37-37.9	1.19
29-29.9	1.03	38-38.9	1.21
30-30.9	1.05	39-39.9	1.23
31-31.9	1.07	40 and above	1.25
32-32.9	1.09		

Choctaw and Darrow

Jan. 28, 1937, initial posting; same schedule as Humble posts in Mirando, Tex., which see.

Smackover, Ark. $0.90
Urania, La. (La. Oil Refg. Co., Jan. 10, '36) 0.97
Tepetate, La. (Continental Oil, Jan. 28, '37) 1.24

Jan. 28, 1937, Magnolia met S. O. La.'s No. La.-Ark. gravity and price schedule in Pine Island, Haynesville, Bull Bayou and Cotton Valley, La., and in Eldorado and Rainbow districts, Ark.; and met S. O. La.'s Rodessa prices; and in Lockport, Iowa, Cameron Meadow, La., posted Humble's gravity and price schedule on Mirando.

Jan. 28, The Texas Co. met S. O. La. in N. La., except that its gravity schedule begins with below 27 at $0.94. It posted $1.37 for Garden Island, La., $1.24 for LaFitte, La. and $0.90 for Smackover.

*GULF COASTAL FIELDS

Posted by Humble Oil & Refining Co. and The Texas Co.

	(Effective Jan. 28, 1937) Humble	Texas	Saxet (Humble) (July 6 '37)
Below 18	$0.95	$0.90	....
18-18.9	for	0.92	....
19-19.9	below	0.94	....
20-20.9	21°	0.96	$1.01
21-21.9	0.98	0.98	1.03
22-22.9	1.01	1.01	1.05
23-23.9	1.04	1.04	1.07
24-24.9	1.07	1.07	1.09
25-25.9	1.10	1.10	1.11
26-26.9	1.13	1.13	1.13
27-27.9	1.15	1.15	1.15
28-28.9	1.17	1.17	1.17
29-29.9	1.19	1.19	1.19
30-30.9	1.21	1.21	1.21
31-31.9	1.23	1.23	1.23
32-32.9	1.25	1.25	1.25
33-33.9	1.27	1.27	1.27
34-34.9	1.29	1.29	1.29
35-35.9	1.31	for	1.31
36-36.9	1.33	oil	1.33
37-37.9	1.35	34°	1.35
38-38.9	1.37	and	1.37
39-39.9	1.39	above.	1.39
40 and above	1.41	....	1.41

Effective Dec. 1, 1934, Humble prices are based on 99% tank tables at 60F. Allowance or deduction of 1% is made for each 25° change in temperature above or below 60F

*Humble's prices apply in these fields: Barbers Hill, Goose Creek, Hull, Humble, Liberty, Moss Bluff, Mykawa, Orange, Pierce Junction, Plymouth, Rabbs Ridge, Raccoon Bend (shallow sand), Refugio light and †heavy, Sour Lake, Spindletop, Sugarland and West Columbia. †Except these grades of Refugio heavy: effective July 6, 1937: Below 20, $0.95; 20-20.9, $1.01; 21-21.9, $1.03; 22-22.9, $1.05; 23-23.9, $1.07; 24-24.9, $1.09; and 25-25.9, $1.11; rest of schedule same as other Gulf Coastal crude.

Jan. 28, Sinclair-Prairie met above Humble schedule in full.

July 6, 1937, The Texas Co. posted for Refugio, which includes Greta, Saxet and Taft: $1.01 for below 21, plus 2c differential, to $1.17 for 28 & above.

Texas Co. postings in Gulf Coastal Texas include: Arriola, Five Corners, Ganado, Humble, Liberty, Magnet, Manvel, Markham, Mauritz, Pickett Ridge, Port Neches, Sour Lake, West Columbia and Withers. In Gulf Coastal Louisiana: Bay St. Elaine, Caillou Island, Dog Lake, Four Isle, Gillis, Horseshoe Bayou, Iberia, Lake Barre, Lake Pelto, Leesville and Port Barre.

ROCKY MOUNTAIN FIELDS

Posted by Stanolind Oil & Gas Co.

(Effective Jan. 28, 1937)

Salt Creek, Midway and Dutton Creek, Wyo., same schedule as Stanolind posts in Oklahoma, Kansas which see under Mid-Continent crude on previous page.

Greybull-Torchlight	$1.30
Iles, light, Col.	1.18
Iles, heavy	1.12
Hogback, N. M.	1.33
Big Muddy	1.23
Elk Basin, light	1.30
Grass Creek, light	1.30
Frannie light	0.82

(Effective Nov. 4, 1936)

Grass Creek, heavy	$0.62
Frannie heavy	0.62
Hamilton Dome, Wyo.	0.57

Pondera, Mont., (Postings discontinued July 1, 1936, but Stanolind pays price posted by Ohio Oil for Kevin-Sunburst, less 20c per bbl.)

Posted by Ohio Oil Co

(Effective Jan. 28, 1937)

Elk Basin, Wyo.	$1.30
Grass Creek, light	1.30
Rock Creek	1.205
Lance Creek	0.97
Sunburst, Mont.	1.20

Posted by *International Refg. Co.

Cut Bank, Mont.

(Effective Jan. 28, 1937)

Below 35°	$1.34	38-38.9	$1.42
35-35.9	1.36	39-39.9	1.44
36-36.9	1.38	40 and above	1.46
37-37.9	1.40		

*Texas Co. subsidiary.

Posted by Continental Oil Co.

(Effective Jan. 28, 1937)

Cat Creek, Mont.	$1.40
Big Muddy, Wyo.	1.18
Lance Creek, Wyo.	0.97

CALIFORNIA, *Posted by Standard Oil of California*

All gravities above those quoted take highest price offered in the field. Prices effective Feb. 26, 1936, except Huntington Beach, Playa del Rey, Santa Fe Springs, Kern Front, Signal Hill (Long Beach) effective March 7, 1936; Elk Hills effective June 22, 1936; Lakeview Area, Aug. 19, 1936; El Segundo and Wilmington, Oct. 15, 1937

Gravity	Signal Hill (Long Beach) El Segundo †Wilmington	Seal Beach	Alamitos Heights	Huntington Beach	Inglewood	Playa del Rey	Olinda Brea Canon	Athens Rosecrans	Dominguez	Torrance	Richfield	Whittier East Coyote (La Habra)	Montebello	West Coyote Hills	Santa Fe Springs	‡Newhall and others	Mountain View	Elk Hills	Buena Vista Hills **Midway-Sunset	Lakeview Area	Lost Hills	Coalinga	Wheeler Ridge
14-14.9	$0.80	0.79	0.74	0.78	0.79	0.80	0.76	---	---	0.80	0.76	0.76	0.77	0.78	---	0.70	---	0.70	0.70	0.70	0.70	0.70	---
15-15.9	.80	.79	.74	.78	.79	.80	.76	---	---	.80	.76	.76	.77	.78	---	.70	---	.70	.70	.70	.70	.70	---
16-16.9	.80	.79	.74	.78	.79	.80	.76	---	---	.80	.76	.76	.77	.78	---	.70	---	.70	.70	.70	.70	.70	---
17-17.9	.80	.79	.74	.78	.81	.80	.76	---	---	.80	.76	.76	.77	.78	---	.70	---	.70	.70	.70	.70	.70	---
18-18.9	.80	.79	.74	.78	.84	.80	.78	---	---	.82	.76	.76	.77	.78	---	.70	---	.70	.70	.70	.70	.70	---
19-19.9	.82	.79	.74	.82	.87	.84	.81	---	---	.85	.76	.78	.77	.78	---	.70	.70	.74	.74	.74	.74	.71	.70
20-20.9	.85	.79	.74	.85	.90	.88	.84	---	---	.88	.78	.82	.77	.80	---	---	.70	.78	.78	.78	.78	.72	.70
21-21.9	.88	.79	.74	.89	.93	.93	.88	---	---	.91	.80	.85	.77	.84	.78	---	.73	.82	.82	.82	.82	.74	.70
22-22.9	.92	.82	.74	.92	.96	.98	.92	---	---	.93	.84	.89	.79	.88	.78	---	.77	.87	.87	.87	.86	.78	.73
23-23.9	.95	.86	.77	.96	.99	1.02	.96	.84	.79	.96	.88	.93	.82	.92	.78	---	.80	.92	.92	.92	.90	.82	.76
24-24.9	.99	.91	.80	1.00	1.02	1.06	.99	.88	.81	.99	.91	.96	.85	.96	.82	---	.84	.97	.97	.97	.94	.86	.79
25-25.9	1.03	.95	.82	1.03	1.05	1.11	1.03	.93	.83	1.02	.95	---	.89	.99	.86	---	.88	1.01	1.01	1.01	.98	.90	.83
26-26.9	1.06	1.00	.85	1.07	1.09	1.16	1.06	.98	.86	1.05	.98	---	.92	1.03	.90	---	.91	1.06	1.06	1.06	1.02	---	---
27-27.9	1.10	1.05	.88	1.11	1.12	---	1.10	1.03	.88	---	1.02	---	.96	1.06	.95	---	.95	1.10	1.10	1.10	1.06	---	---
28-28.9	1.14	1.10	.90	1.14	1.15	---	1.14	1.07	.90	---	1.06	---	.99	1.10	.99	---	.99	1.15	1.15	1.15	1.10	---	---
29-29.9	1.17	1.15	.93	1.18	1.18		1.17	1.12	.93	---	1.09	---	1.03	1.14	1.03	---	1.02	1.20	1.20	1.20	1.14	---	---
30-30.9	1.21	1.19	.95	1.22	1.21		1.21	1.17	.95	---	....	---	1.07	1.17	1.08	---	1.06	1.25	1.25	1.25	1.18	---	---
31-31.9				....	1.24		1.24	1.22	.97	---	---	---	1.11	1.21	1.12	---	1.09	1.29	1.29	1.29			
32-32.9	*Elwood Terrace			....	1.27		1.27	1.27	1.00	---	---	---	1.14	1.25	1.16	---	1.13	1.34	1.34	1.34	Kettleman Hills		
33-33.9	....	1.28	....	....	....		---	1.32	....	---	---	---	1.18	1.28	1.20	---	1.17	1.38	1.38	1.38	---	1.19	---
34-34.9	....	1.32	....	....	....		---	1.37	---	---	---	---	1.22	1.32	1.25	---	1.20	....	....	....	---	1.23	---
35-35.9	....	1.35	....	....	....		---	1.42	---	---	---	---	1.25	---	1.29	---	---	---	---	---	---	1.27	---
36-36.9	....	1.39	....	....	....		---	1.46	....	---	---	---	1.29	---	1.33	---	---	---	---	....	---	1.31	---
37-37.9	....	1.43	....	....	....		---	1.51	---	---	---	---	1.32	---	1.37	---	---	---	---	....	---	1.35	---
38-38.9	....	....	....	....	....		---	1.56	....	---	---	---	1.36	---	1.42	---	---	---	---	....	---	1.39	---
39-39.9	....	....	....	....	....		---	1.61	---	---	---	---	1.40	---	---	---	---	---	---	....	---	1.43	---
40-40.9	....	....	....	....	....		---	1.66	---	---	---	---	1.43	---	---	---	---	---	---	....	---	---	---

F.O.B. Standard Pipe Line

*F. o. b. ship.
‡Also McKittrick, Kern River, Kern Front and Round Mountain $0.70 thru 19.9 gravity; no higher gravity quoted. **Except Lakeview Area. †Wilmington prices differ on gravities below 18.9. Prices are: 14-16.9, $0.75; 17-17.9, $0.77; and 18-18.9, $0.79; rest of schedule same as Signal Hill.

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Coming Meetings

Virginia Oil Jobbers Assn., John Marshall Hotel, Richmond, Dec. 10.
National Asphalt Conference, Memphis, Tenn., week of Dec. 6.
American Society of Mechanical Engineers, New York, Dec. 6 to 10.
Exposition of Chemical Industries, Grand Central Palace, New York, N. Y., Dec. 6 to 11.
Nebraska Petroleum Marketers, Inc., Omaha, Nebr., Dec. 7, 8 and 9.
Society of Automotive Engineers, National Production Meeting, Hotel Durant, Flint, Mich., Dec. 8, 9 and 10.
American Chemical Society, Division Organic Chemistry, Richmond, Va., Dec. 28, 29 and 30.

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Independent Oil Jobbers Assn. of Okla., Oklahoma City, Okla., Jan. 13.
Northwest Petroleum Assn., North Dakota Division, Minot, N. D., Jan. 24 and 25.
Northwest Petroleum Assn., Minnesota Division, Hotel Radisson, Minneapolis, Jan. 27 and 28.
Kentucky Petroleum Marketers Assn., Brown Hotel, Louisville, Ky., Feb. 7, 8 and 9.
Kansas Oil Men's Assn., 24th annual convention and oil exposition, Hotel Broadview, Wichita, Kans., Feb. 14 and 15.

Pa. Refinery Lubricating Oil Inventory

(Issued as of Nov. 4 by National Petroleum Assoc.)

	Gallons
1. **Raw Long Residuum** (Including all raw long residuum below, and not salable, as 600 fire)	1,098,795
2. **600 Steam Refined** (Includes all steam refined stock commonly sold or used as 600 and as raw material for bright stocks)	9,824,767
3. **Other Steam Refined** (Not included in 1 and 2, above)	5,017,523
4. **Finished Dewaxed Long Res.**	3,024,706
5. **Bright Stock** (Does not include any material reported in 4, above)	14,764,259
6. **Viscous Neutral,** below 180 vis. but not below 142 vis. @ 100	8,360,021
7. **Viscous Neutral,** 180 vis. @ 100 and above	7,749,192